MODENAS

SERVICE MANUAL

AN110E-D310
AN110F-D310

AN110R-C310
AN110H-C310

DRB-HICOM

EMOS
EDARAN MODENAS SDN. BHD.

MODENAS

KRISS E/F 2003
KRISS R/H 2003

Motorcycle
Service Manual

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The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. See your dealer for the latest information on products improvements incorporated after this publication.

All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

MODENAS

KRISS E/F 2003
KRISS R/H 2003

MODEL APPLICATION

Year	Model
2003	AN110E/F-D310
2003	AN110R/H-C310

MODENAS
Motosikal Dan Enjin Nasional Sdn Bhd

LIST OF ABBREVIATIONS

A	ampere	L	liter
ABDC	after bottom dead center	lb	pound
AC	alternating current	m	meter
ATDC	after top dead center	min	minute
BBDC	bottom dead center	N	newton
BTDC	before top dead center	Pa	pascal
°C	degree celcius	PS	horse power
DC	direct current	psi	pound per square inch
F	farad	r	revolution
°F	degree fahrenheit	rpm	revolution per minute
ft	foot, feet	TDC	top dead center
g	gram	TIR	total indicator reading
h	hour	V	volt
W	watt	Ω	ohm

This warning may apply to any of the following components of any assembly containing one or more of these components:

Brake shoes or pads
Clutch friction material
Gasket
Insulator

SAFETY INTSTRUCTION

- Operate if possible outdoor or in a wall ventilated place.
- Preferably use hand tools or low speed tools equipped, if necessary with an appropriate dust extraction facility. If high speed tools are used, they should always be fully equipped.
- If possible, dampen before cutting or drilling.
- Dampen dust and place it in properly closed receptacle and dispose it of safely.

WARNING
CONTAINS
ASBESTOS

Breathing asbestos dust is dangerous to health

Follow safety instruction

Read OWNER'S MANUAL before operating.

FOREWORD

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contain enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair work satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipments are specified, do not use makeshifts tools because the use of substitute tools may adversely affect safe operation.

For the duration of your warranty period, especially, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your motorcycle.

1. Follow the Period Maintenance Chart in the Service Manual.
2. Be alert for problems and non-scheduled maintenance.
3. Use proper tools and genuine MODENAS motorcycle parts. Special tools, gauges, and testers that are necessary when servicing MODENAS motorcycle are introduced by the Special Tool Catalog. Genuine parts provided as spare parts are listed in the Parts catalog.
4. Follow the procedures in this manual carefully. Don't take shortcuts.
5. Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to use this manual

In preparing this manual, we divided the product into its major systems. These systems become the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

The Quick Reference Guide shows you all of the products systems and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want information on spark plug, for example, go to the Periodic Maintenance Chart first. The chart will show you the information on how frequent to clean the plug. Next, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the spark plug section.

Whenever you see these WARNING and CAUTION symbols, heed the instruction! Always follow safe operating and maintenance practice.

⚠ WARNING
This warning symbol identifies special instructions or procedures which, if not followed, could result in personal injury, or loss of life.

CAUTION
This warning symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destructions of equipment.

This manual also contains four more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

o *This note symbol indicates points of particular interest for more efficient and convenient operation.*

- ● Indicates a procedural step or work to be done.
- ★ Indicates a conditional step or what action to take based on the procedural step or sub step it follows.
- ○ Indicates a procedural step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

In most chapters and exploded view, illustration of the system components follow the Table of Contents. In these illustrations you will find the instruction indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

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Before Servicing

Before starting to service a motorcycle, it is recommended to read the applicable document carefully to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations, and certain knowledge is required for successful work.

Especially note the following:

I. Dirt

Before removal and disassembly, clean the motorcycle. Any dirt or other parts entering shall work as an abrasive and shorten the life of the motorcycle. For the same reason, before installing a new part, clean off any dust or metal filings.

1. Battery Ground

Remove the ground (-) lead from the battery before performing any disassembly operations on the motorcycle. This prevent:

(a) the possibility of accidentally turning the engine over while partially disassembled.

(b) sparks at electrical connections which will occur when they are disconnected.

(c) damage to the electrical system.

2. Tightening Sequence

Generally, when installing a part with several bolts or nuts, start them all in their holes and tighten them to a snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage.

3. Torque

When torque values are given in this Services Manual, use them. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

4. Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems difficult to remove or install, then stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic - faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.

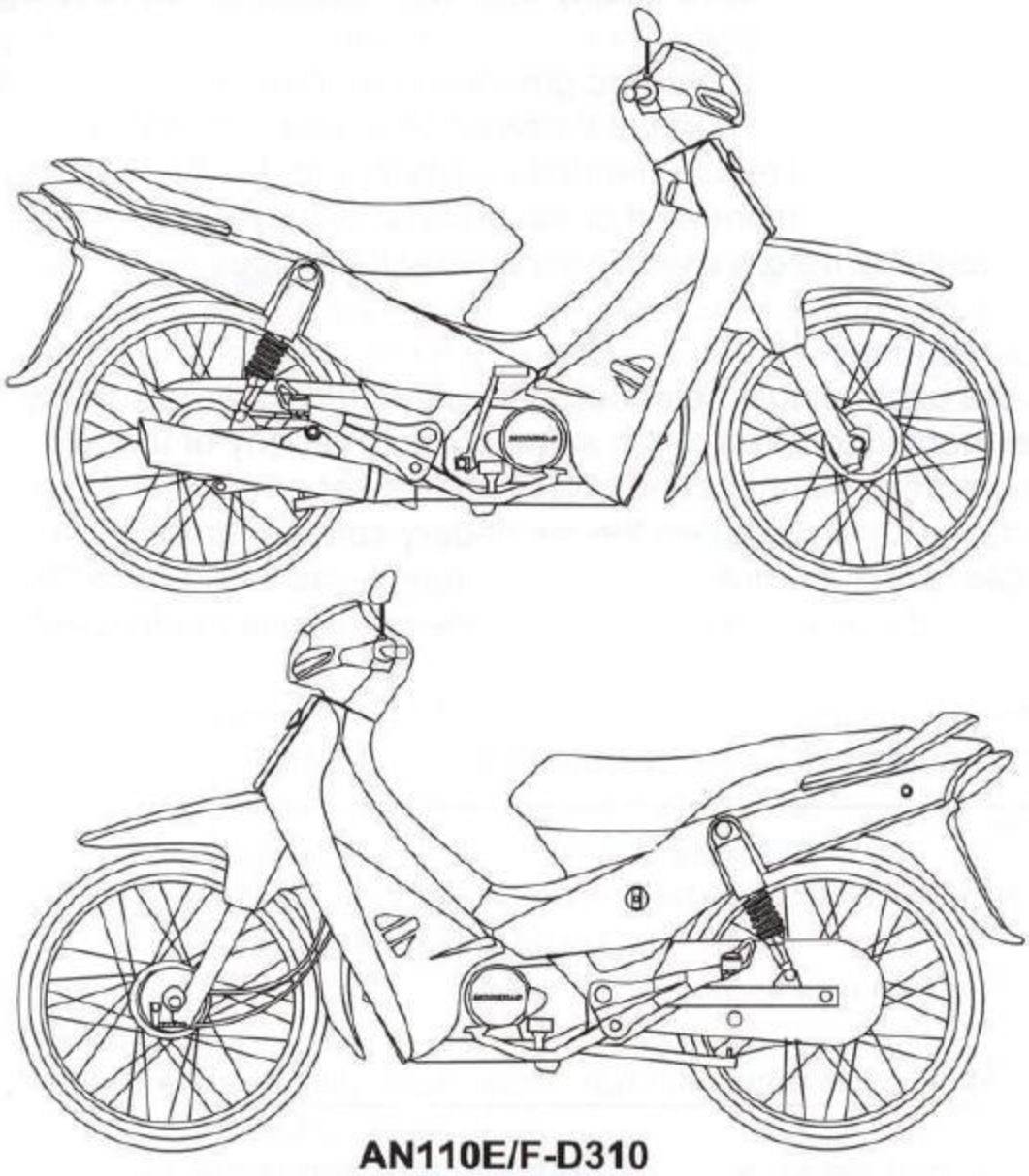
6. Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

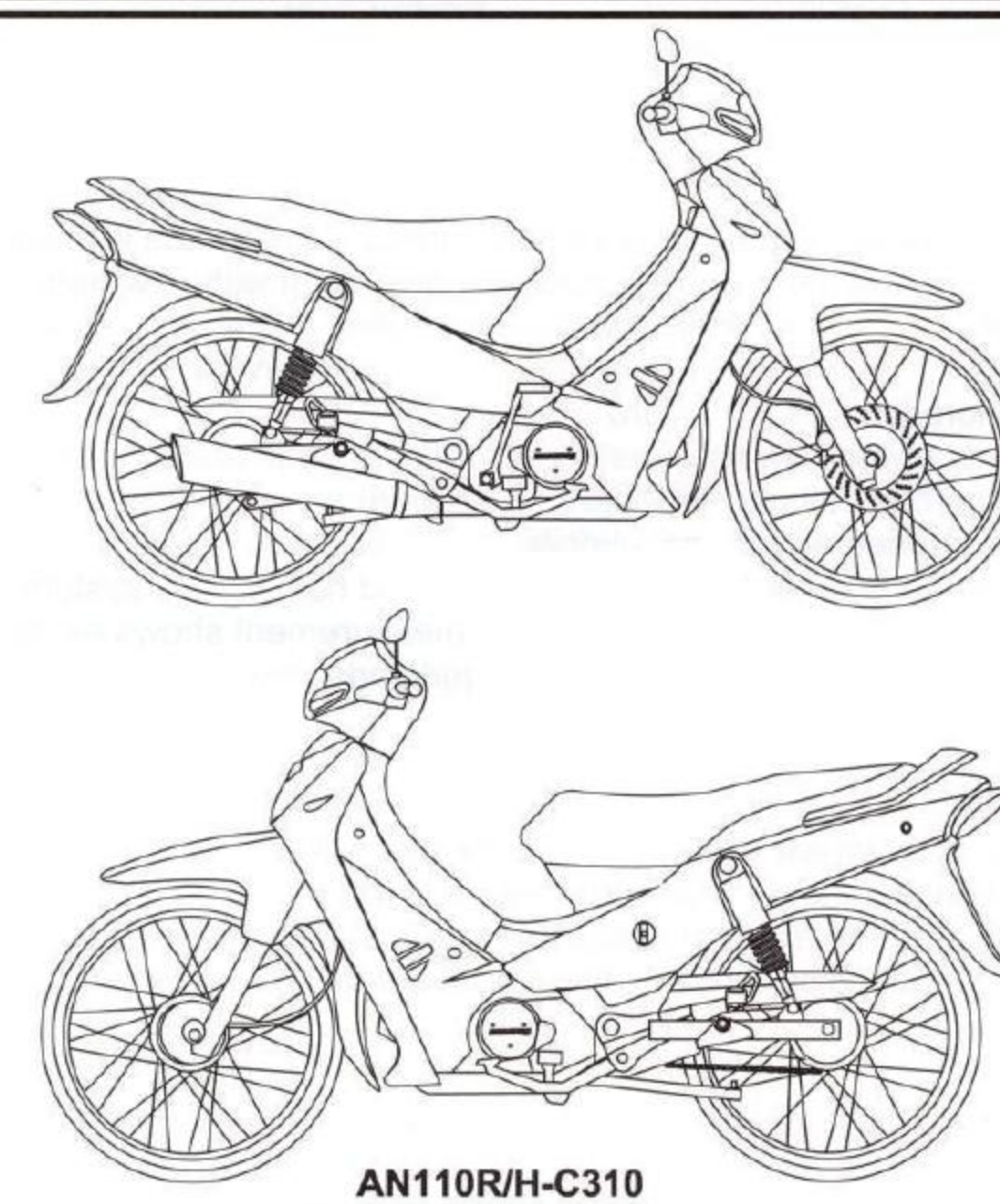
7. High-Flash Point Solvent

A high-flash point solvent is recommended to reduce fire danger. A commercial solvent commonly available is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

Model Identification



AN110E/F-D310



AN110R/H-C310

General Specifications

Item		AN110E/F-D310	AN110R/H-C310
Dimensions :			
Overall length		1910 mm	←
Overall width		670 mm	←
Overall height		1050mm	←
Wheel base		1245 mm	←
Road clearance		135 mm	←
Seat height		750 mm	←
Dry weight		98 kg	100 kg
Curb weight :	Front	43 kg	44kg
	Rear	60 kg	61kg
Fuel tank capacity		4.3 L	←
Performance :			
Minimum turning radius		1.95 m	←
Engine:			
Type		4 - Stroke SOHC, single cylinder	←
Cooling system		Air - cooled	←
Bore and stroke		53.0 x 50.6 mm	←
Displacement		111 mL	←
Compression ratio		9:3:1	←
Maximum horsepower		6.6 kW (9.0 PS) @ 8 500 r/min (rpm)	←
Maximum torque		9.3 N - m (0.95 kgf-m, 82 in-lb) @ 4 000 r/min (rpm)	←
Carburetion system		Carburetor, KEIHIN PB18	←
Starting system		Primary Kick & Electric Starter	Primary Kick & Electric Starter
Ignition system		Magneto CDI	←
Timing advance		Electronically advanced	←
Ignition timing		6.5 BTDC @ 1 200 r/min (rpm) / 27 ° BTDC @ 4 000r/min (rpm)	←
Spark plug		NGK C6HSA (Option :ND U20FS-U)	←
Cylinder numbering		-	-
Firing order		-	-
Valve timing:			
Inlet:	Open	20° BTDC	←
	Close	60° ABDC	←
	Duration	260°	←
Exhaust:	Open	55° BBDC	←
	Close	25° ATDC	←
	Duration	260°	←
Lubrication system		Forced lubrication (wet sump)	←
Engine oil:			
Grade		SF or SG class	←
Viscosity		SAE 20W-40	←
Capacity		1.1 L	←

General Specifications

Item	AN110E/F-D310	AN110R/H-C310
Drive Train :		
Primary reduction system :		
Type	Gear, centrifugal	←
Reduction ratio	3.048 (64/21)	←
Clutch type	Centrifugal & W. M. Disc	←
Transmission :		
Type	4-speed,constant mesh,return shift (down)	←
Gear ratios : 1st	2.563 (41/16)	←
2nd	1.667 (30/18)	←
3rd	1.192 (31/26)	←
4th	0.933 (28/30)	←
Final drive system:		
Type	Chain drive	←
Reduction ratio	3.385 (42/14)	←
Overall drive ratio	9.626 @ Top gear	←
Frame :		
Type	Pipe, backbone	←
Caster (rake angle)	27°	←
Trail	79 mm	←
Front tire: Type	Tube type 38L	←
Size	2.50-17	←
Rear tire : Type	Tube type 41P	←
Size	2.75-17	←
Front suspension :		
Type	Telescopic fork	←
Wheel travel	90 mm	←
Rear suspension :		
Type	Swingarm	←
Wheel travel	85 mm	←
Brake type : Front	Drum	Disc
Rear	Drum	←
Electrical Equipment:		
Battery	12 V 3Ah	12 V 5Ah
Headlight : Type	Multi-reflector beam	←
Bulb	12 V 25/25 W	←
Tail / brake light	12 V 5/18 W	←
Alternator : Type	Single phase AC	←
Rated output	3.3 A/14 V @ 8000 rpm	←

Specifications are subject to change without any notice, and may not apply to every country.

Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

	OPERATION \ FREQUENCY	Whichever comes first / Every	*ODOMETER READING							
			1,000 KM	2,500 KM	5,000 KM	10,000 KM	15,000 KM	20,000 KM	25,000 KM	30,000 KM
	Idle speed		A	A		A		A		A
	Throttle grip play		I		I	I	I	I	I	I
	Spark plug		I	I	I	I	I	I	I	I
#	Valve clearance		I			I		I		I
*	Air cleaner element		I			C		C		R
	Fuel system		I			I		I		I
	Cylinder head bolt or nut		I			I		I		I
	Battery electrolyte level	6 months	I		I	I	I	I	I	I
	Brake free play		I		I	I	I	I	I	I
	Brake light switch		I		I	I	I	I	I	I
*	Brake lining wear				I	I	I	I	I	I
	Clutch release		I	I	I	I	I	I	I	I
#	Steering		I	I	I	I	I	I	I	I
*	Drive chain wear		I	I	I	I	I	I	I	I
#	Spoke tightness and rim runout		I	I	I	I	I	I	I	I
	Nuts, bolts, fasteners		I		I	I	I	I	I	I
	Tire wear				I	I	I	I	I	I
*	Engine oil		R	EVERY 2,500KM						
	Oil filter		R			R		R		R
#	oil screen		C			C		C		C
#	Front fork oil		CHANGE EVERY 2 YEARS							
	Front fork oil leak					I		I		I
	Rear shock absorber oil leak					I		I		I
#	Swingarm pivot					L		L		L
#	Brake camshaft	2 years				L		L		L
#	Steering stem bearing	2 years				L		L		L
#	Brake cable	2 years	I			I		I		I
#	Fuel hose	4 years				I		I		I
*	Drive chain		LUBRICATE EVERY 600 KM							
*	Drive chain slack		CHECK EVERY 1,000 KM							
	Electrical system		I	I	I	I	I	I	I	I

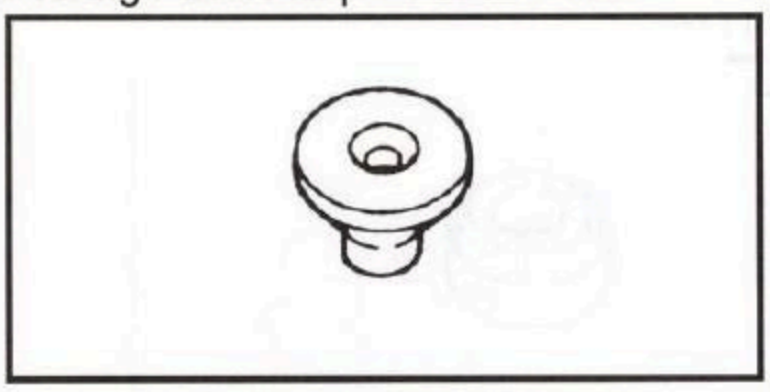
A Adjust
C Clean
Inspect and clean, adjust, lubricate or replace if necessary
L Lubricate
R Replace
Should be service by an authorized EMOS dealers
* Service more frequently when operating in severe conditions: dust, wet, mud, high speed, or frequent starting/stopping.

Torque and Locking Agent

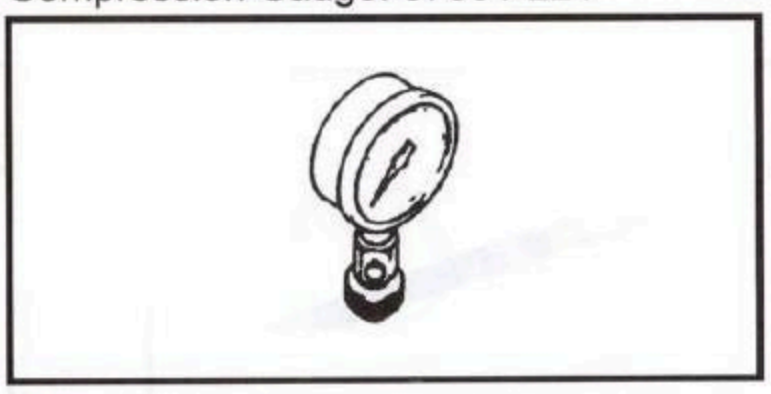
Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Electrical System:				
Gear position switch screw	2.9	0.3	26 in-lb	
Spark plug	13	1.3	9.5	
Electric starter mounting screw	5.4	0.55	48 in-lb	
Starter motor terminal screw	2.0	0.2	17 in-lb	
Brush holder plate screws	1.0	0.1	9 in-lb	
Terminal cover plate screws	2.0	0.2	17 in-lb	
End cover screws	4.4	0.45	39 in-lb	
Electric switch terminal nut	4.9	0.5	69 in-lb	
Torque limiter gear	69	7.0	51	
One way clutch Allen bolts	12	1.2	8.5 in-lb	L
Magneto flywheel nut	42	4.3	31	
Stator coil mounting screws	1.5	0.15	13 in-lb	
Exciter coil mounting screws	1.5	0.15	13 in-lb	
Pick up coil mounting screw	2.9	0.30	26 in-lb	
Magneto cover mounting screw	5.4	0.55	48 in-lb	S
Lead clamp screw	5.4	0.55	48 in-lb	
Pickup soil plate screw	5.4	0.55	48 in-lb	
Magneto cover damper	2.9	0.3	26 in-lb	

Special Tool, Sealant

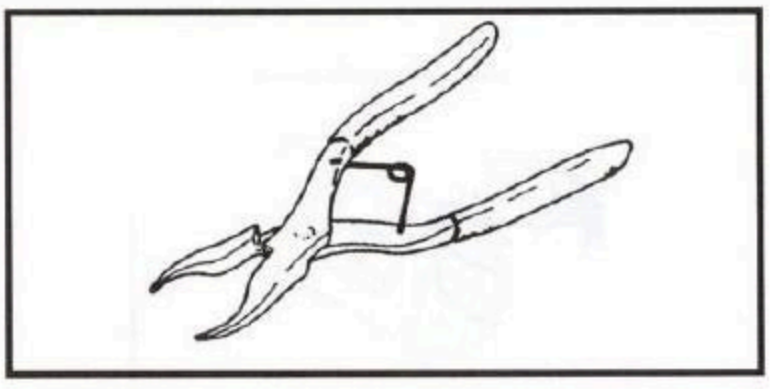
Bearing Puller Adapter: 57001-136



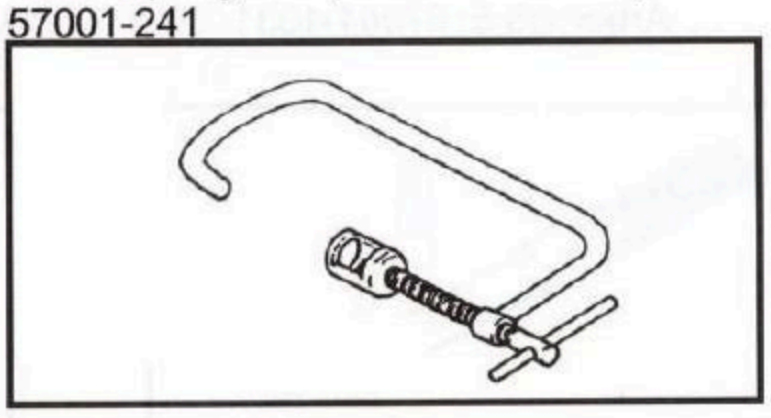
Compression Gauge: 57001-221



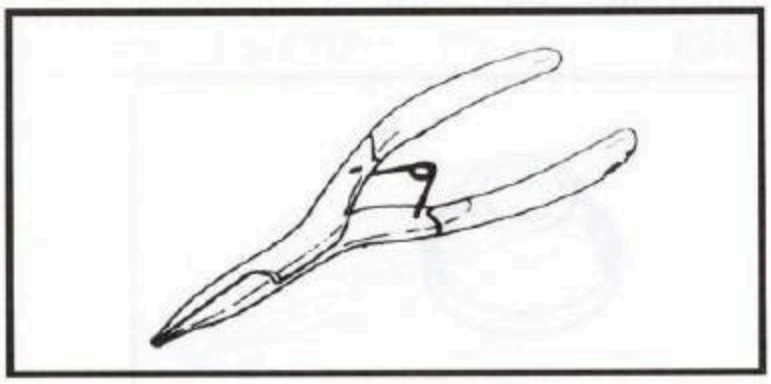
Inside Circlip Pliers: 57001-143



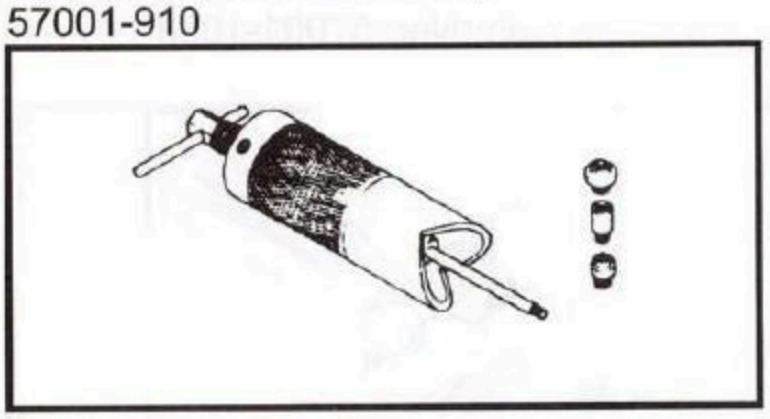
Valve Spring Compressor Assembly: 57001-241



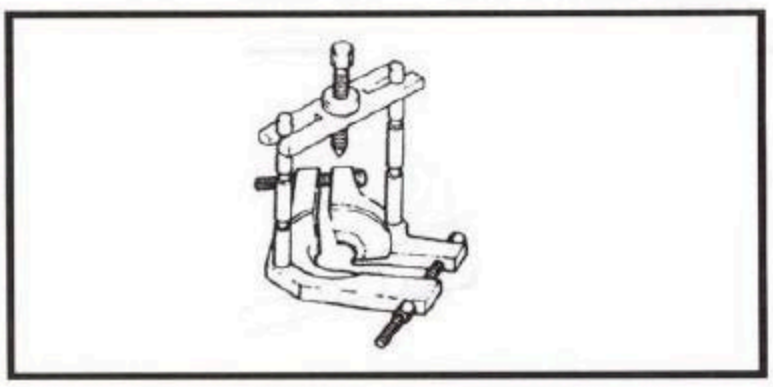
Outside Circlip Pliers: 57001-144



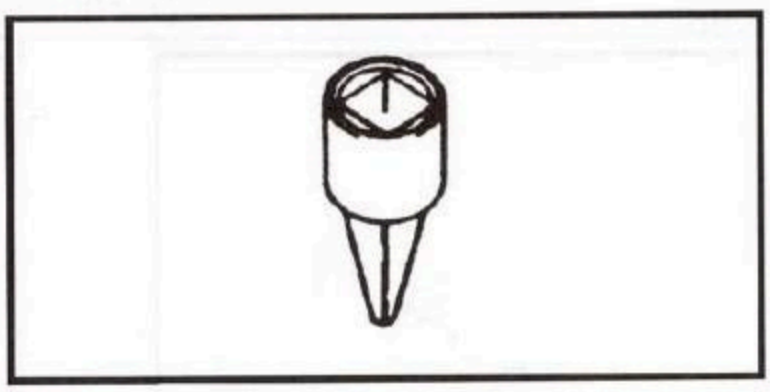
Piston Pin Puller Assembly: 57001-910



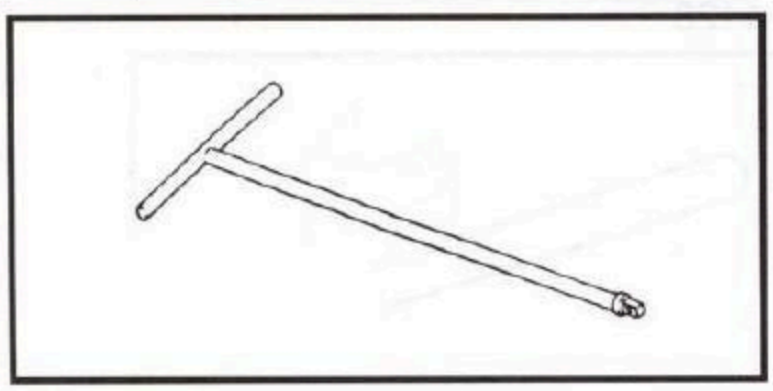
Bearing Puller: 57001-158



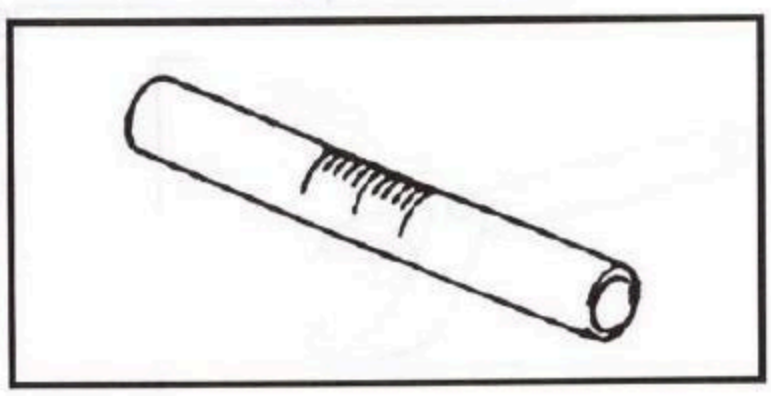
Fork Cylinder Holder Adapter: 57001-1011



Fork Cylinder Holder Handle: 57001-183

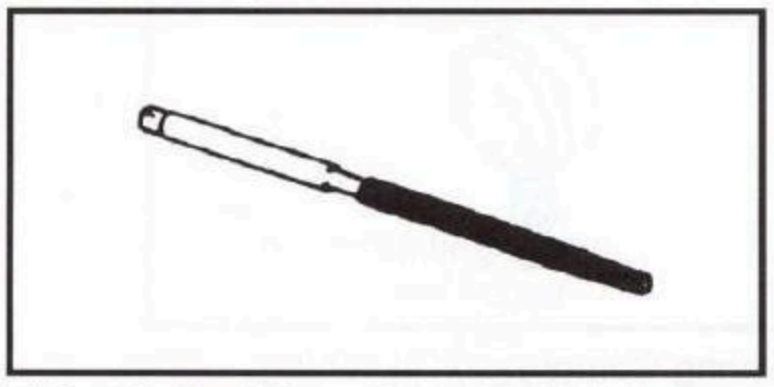


Fuel Level Gauge: 57001-1017

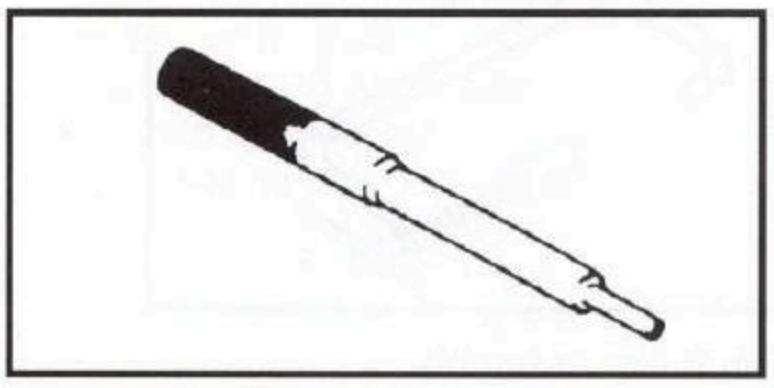


Special Tool, Sealant

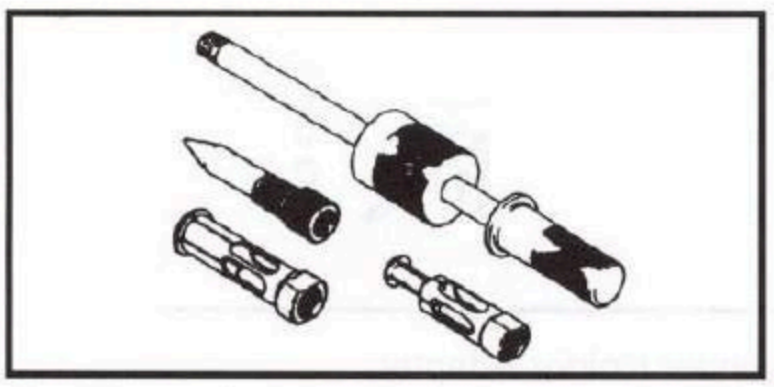
Valve Guide Reamer,⌀5.5: 57001-1333



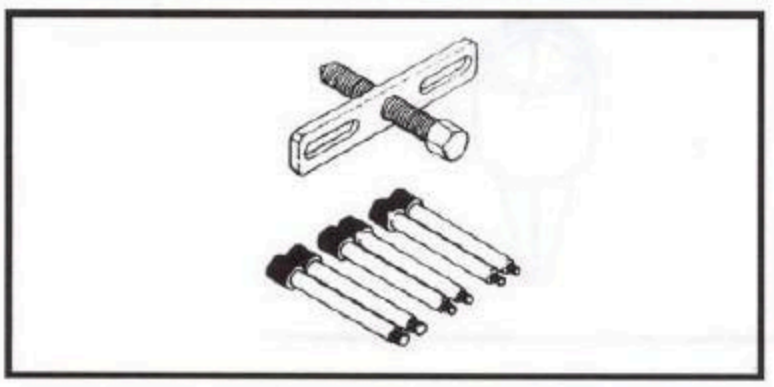
Valve Guide Arbor,⌀5.5: 57001-1331



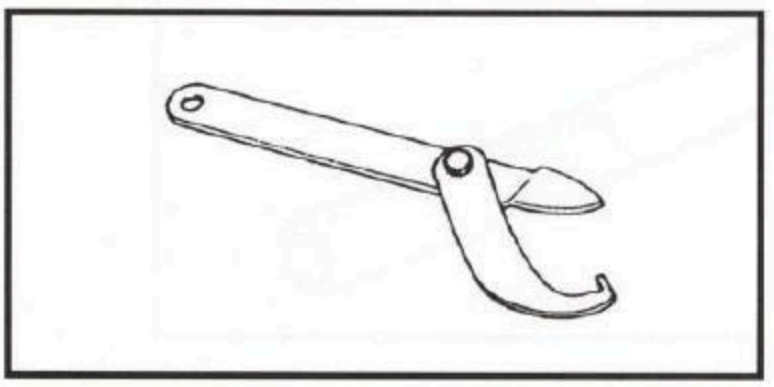
Oil Seal & Bearing Remover: 57001-1058



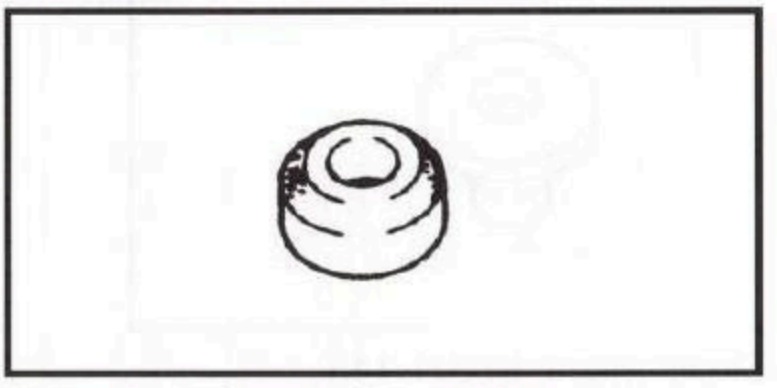
Crankcase Splitting Tool Assembly: 57001-1098



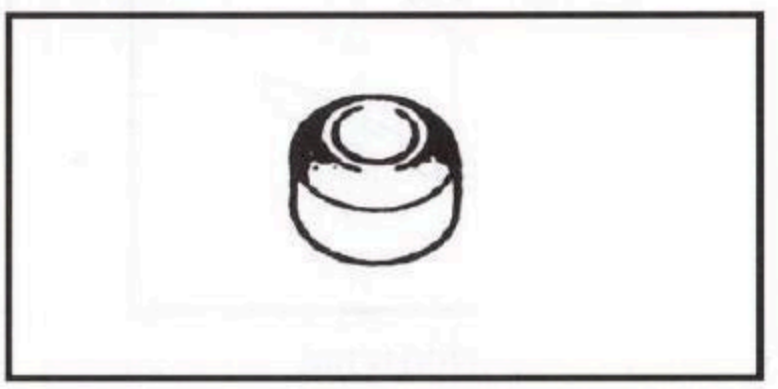
Steering Stem Nut Wrench: 57001-1100



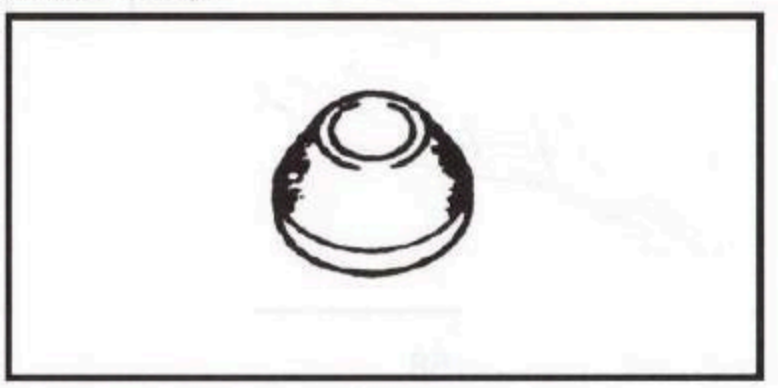
Valve Seat Cutter, 45° -⌀27.5: 57001-1114



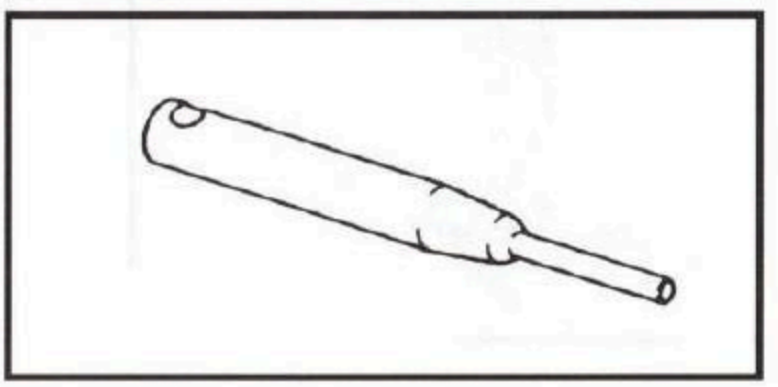
Valve Seat Cutter, 32° -⌀25: 57001-1118



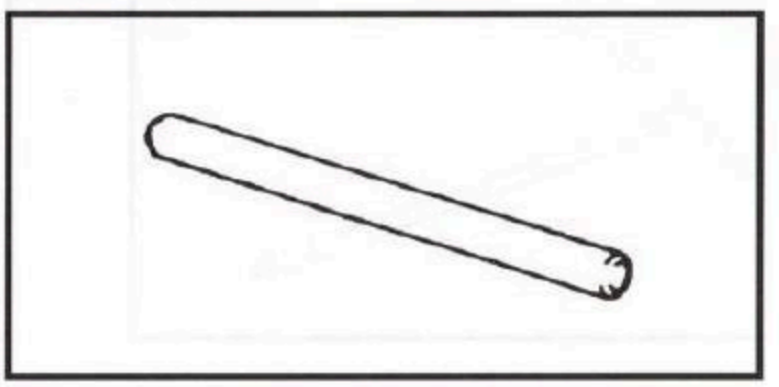
Valve Seat Cutter, 60° -⌀30: 57001-1123



Valve Seat Cutter Holder,⌀5.5: 57001-1125

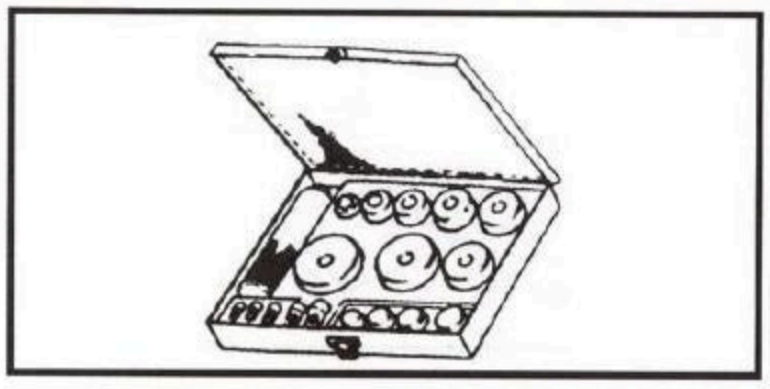


Valve Seat Cutter Holder Bar: 57001-1128

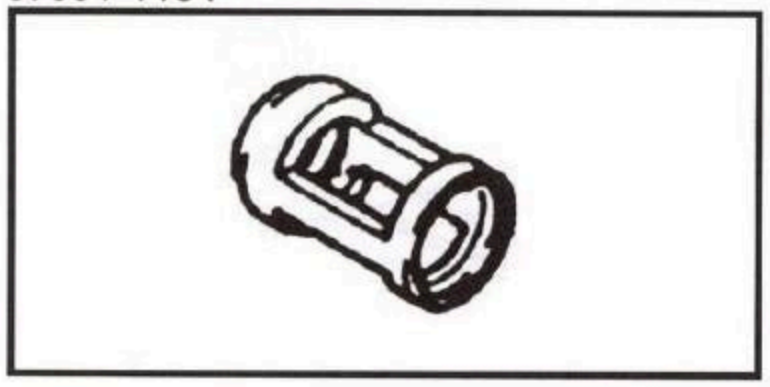


Special Tool, Sealant

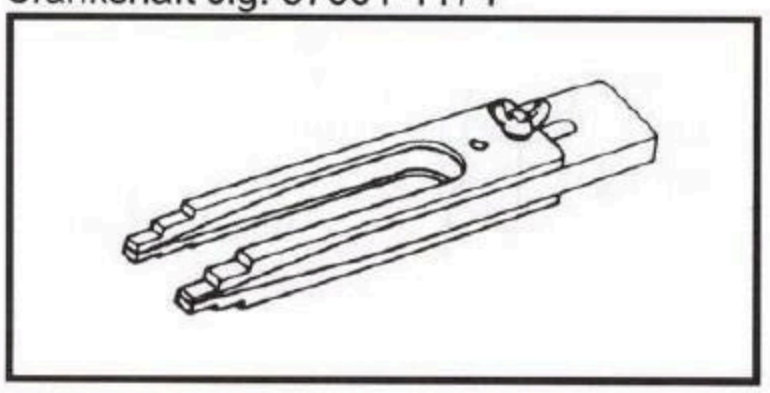
Bearing Driver Set: 57001-1129



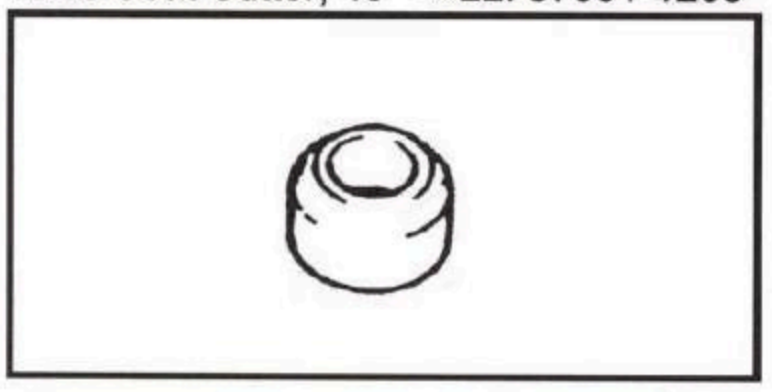
Valve Spring Compressor Adapter,∅20: 57001-1154



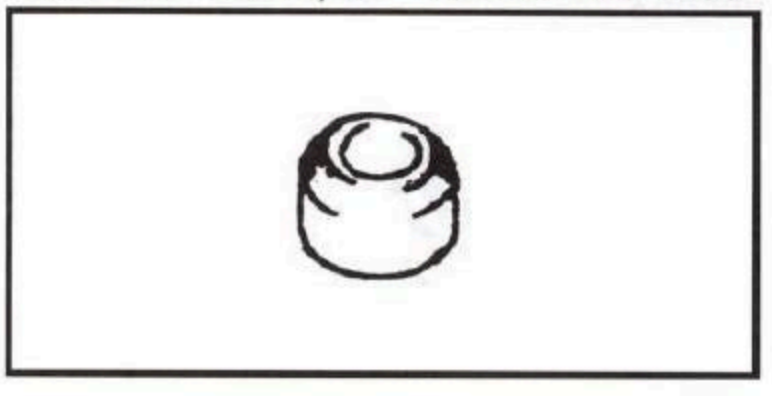
Crankshaft Jig: 57001-1174



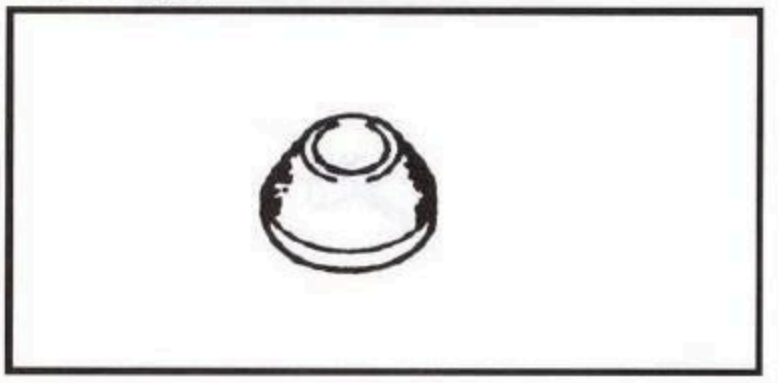
Valve Seat Cutter, 45° -∅22: 57001-1205



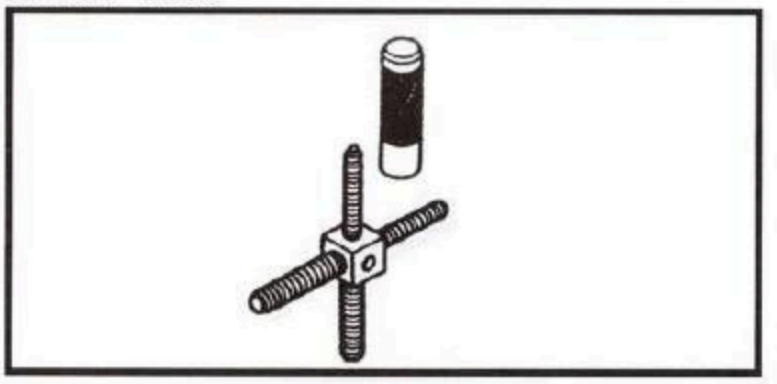
Valve Seat Cutter, 32° -∅22: 57001-1206



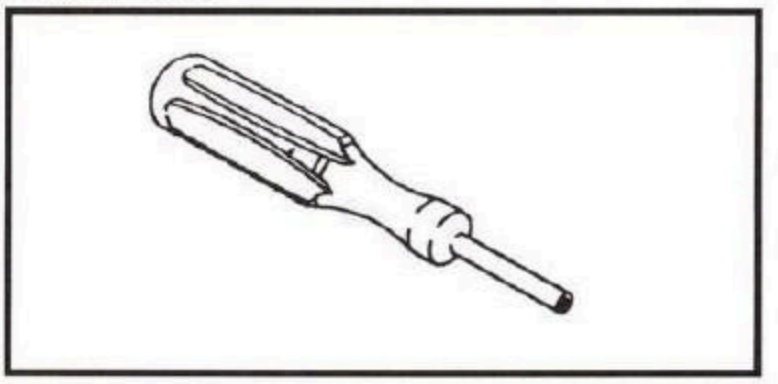
Valve Seat Cutter, 67.5° -∅22: 57001-1207



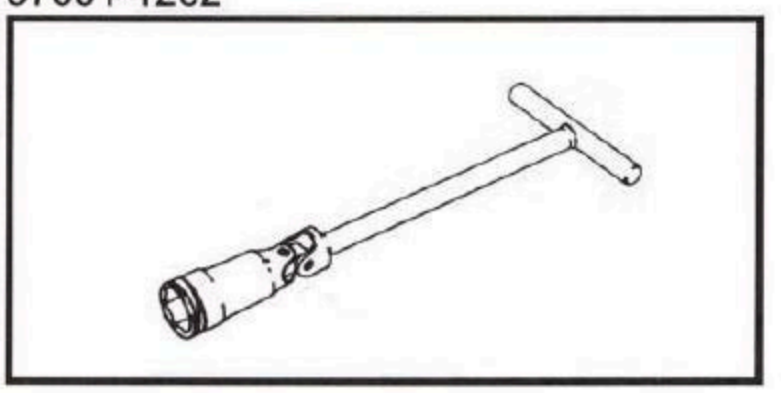
Rotor Puller, M16/M18/M20/M22x1.5: 57001-1216



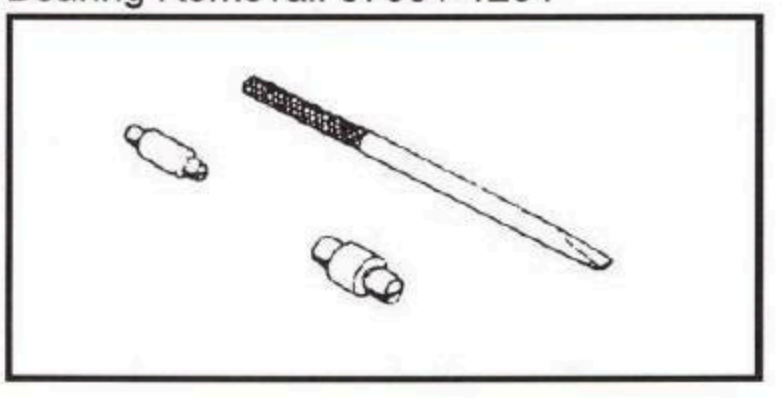
Valve Adjusting Screw Holder: 57001-1217



Spark Plug Wrench, Hex 16: 57001-1262

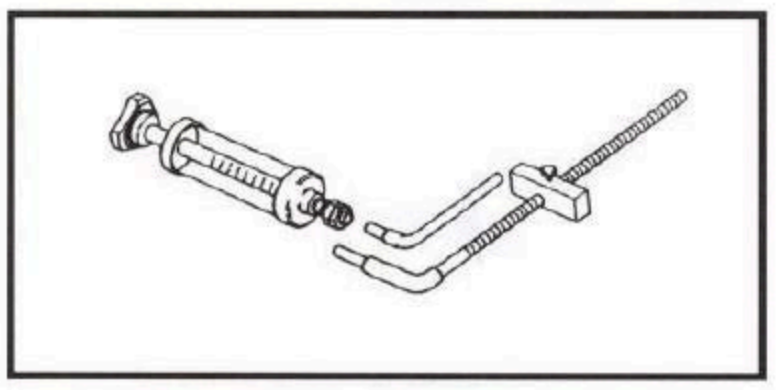


Bearing Removal: 57001-1264

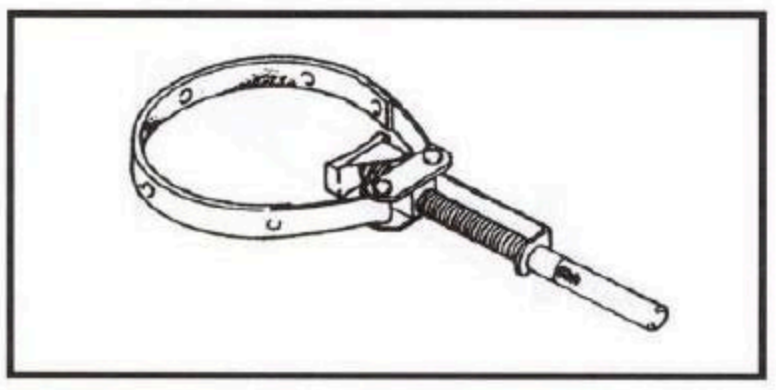


Special Tool, Sealant

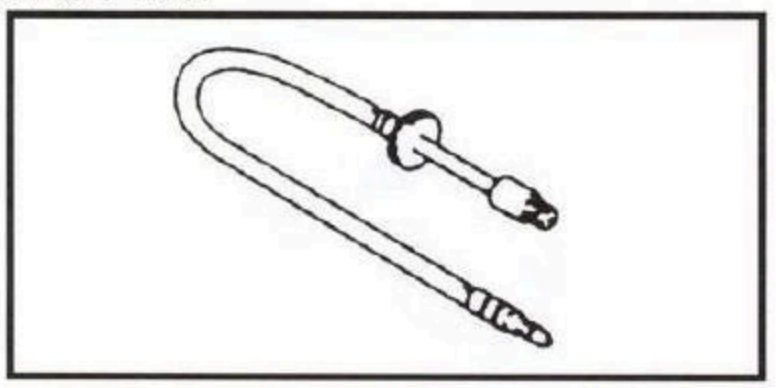
Fork Oil Level Gauge: 57001-1290



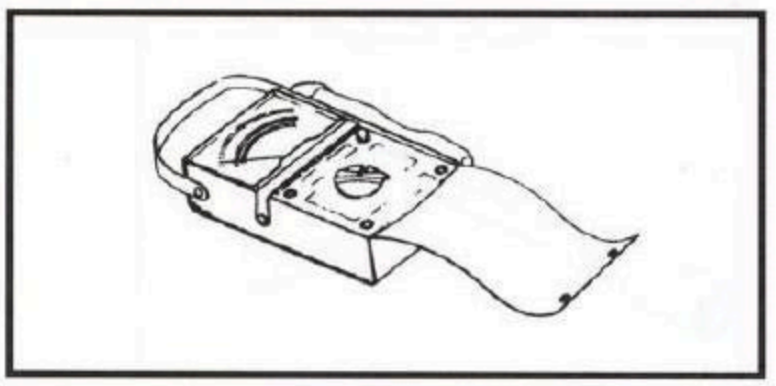
Flywheel Holder: 57001-1313



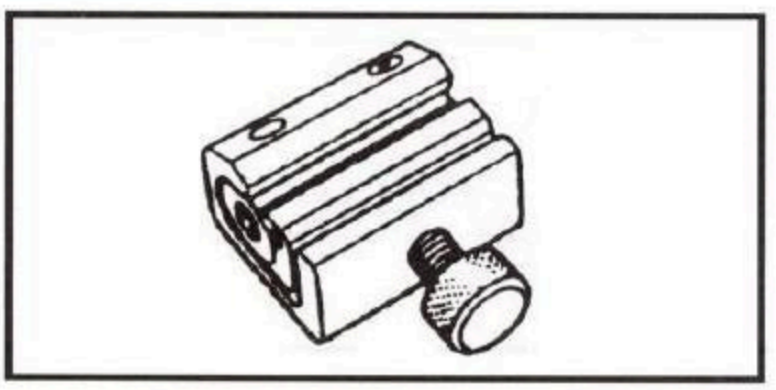
Compression Gauge Adapter, M10 X 1.0: 57001-1317



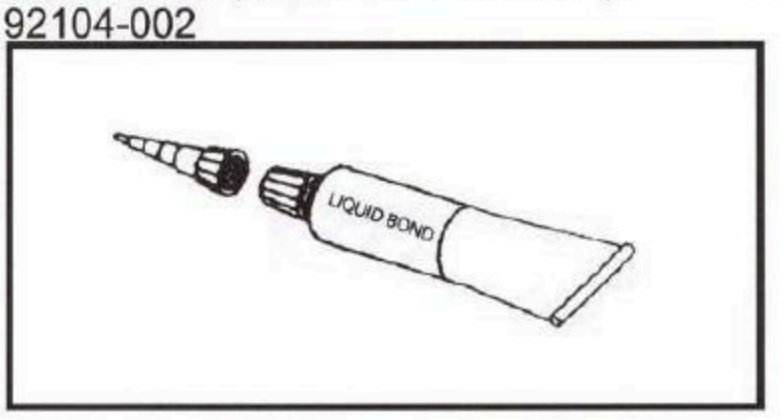
Hand Tester: 57001-1394



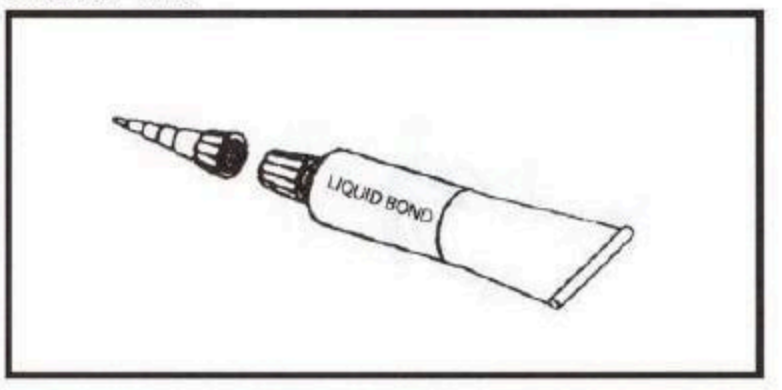
Pressure Cable Luber: K56019-021



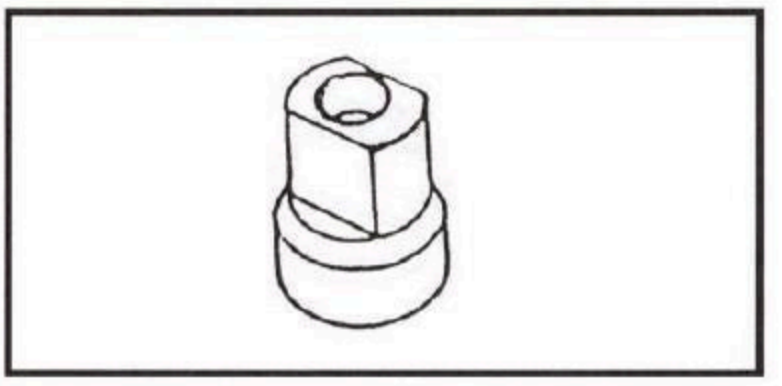
Liquid Bond (Liquid Gasket-Silver): 92104-002



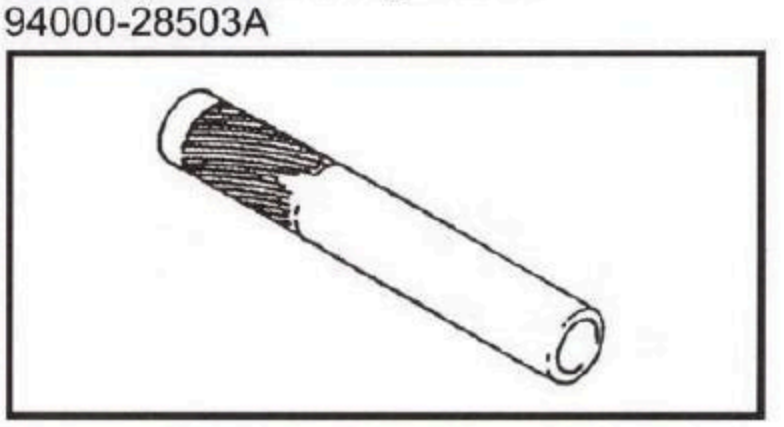
Liquid Bond (Silicone Sealant): 56019-120



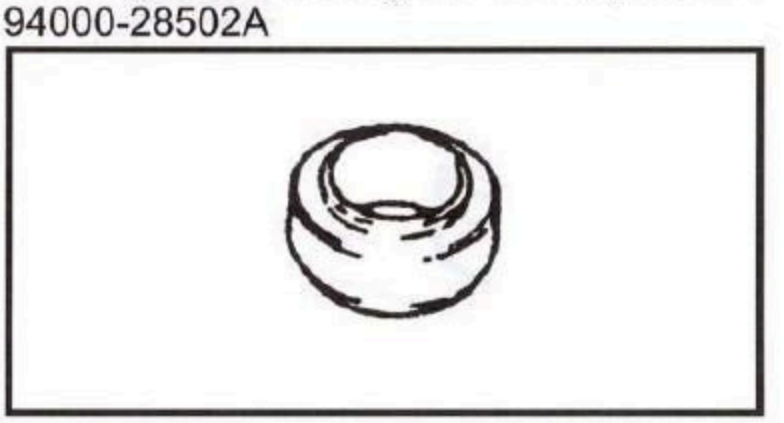
Puller-Flywheel: 94000-4001A



Steering Stem Bearing Driver: 94000-28503A

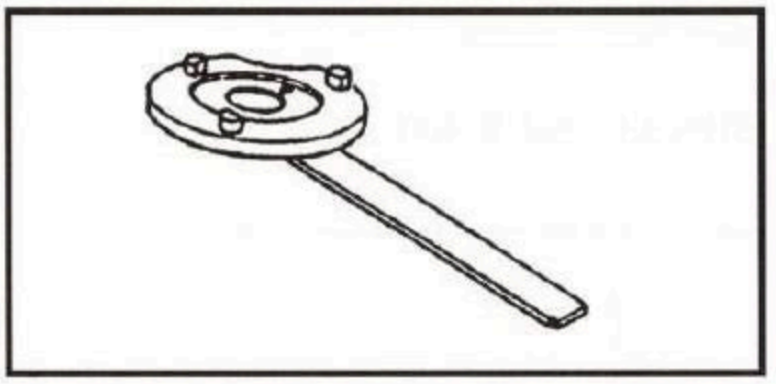


Steering Stem Bearing Driver Adapter: 94000-28502A

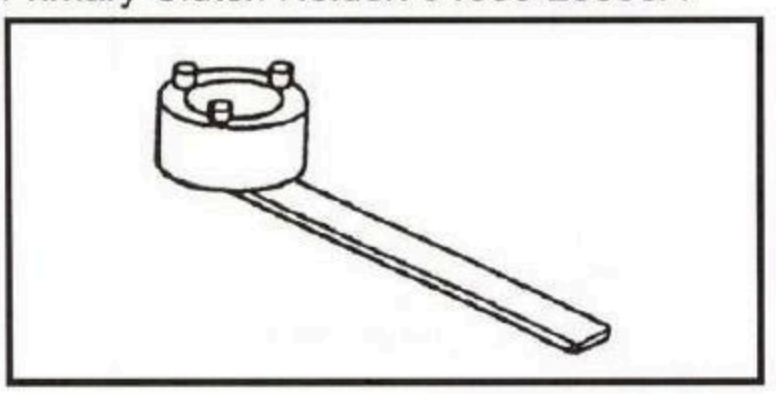


Special Tool, Sealant

Clutch Holder: 94000-28504A



Primary Clutch Holder: 94000-28505A

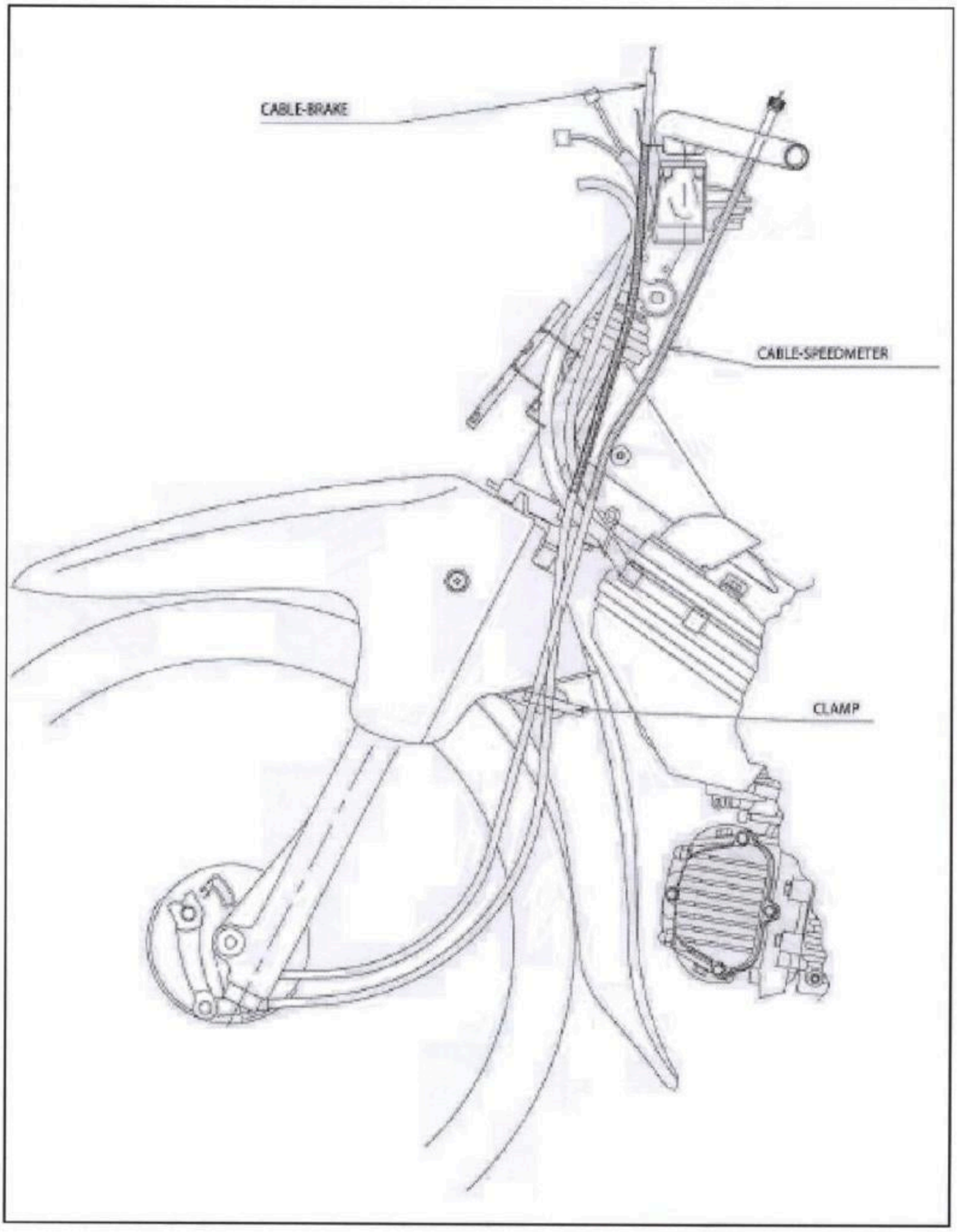


NOTE

- *Use the Liquid Bond (Liquid Gasket - Silver): 92401-002 for the silver engine, and the Liquid Bond (Liquid Gasket - Black): 92104-1003 for the black engine.*

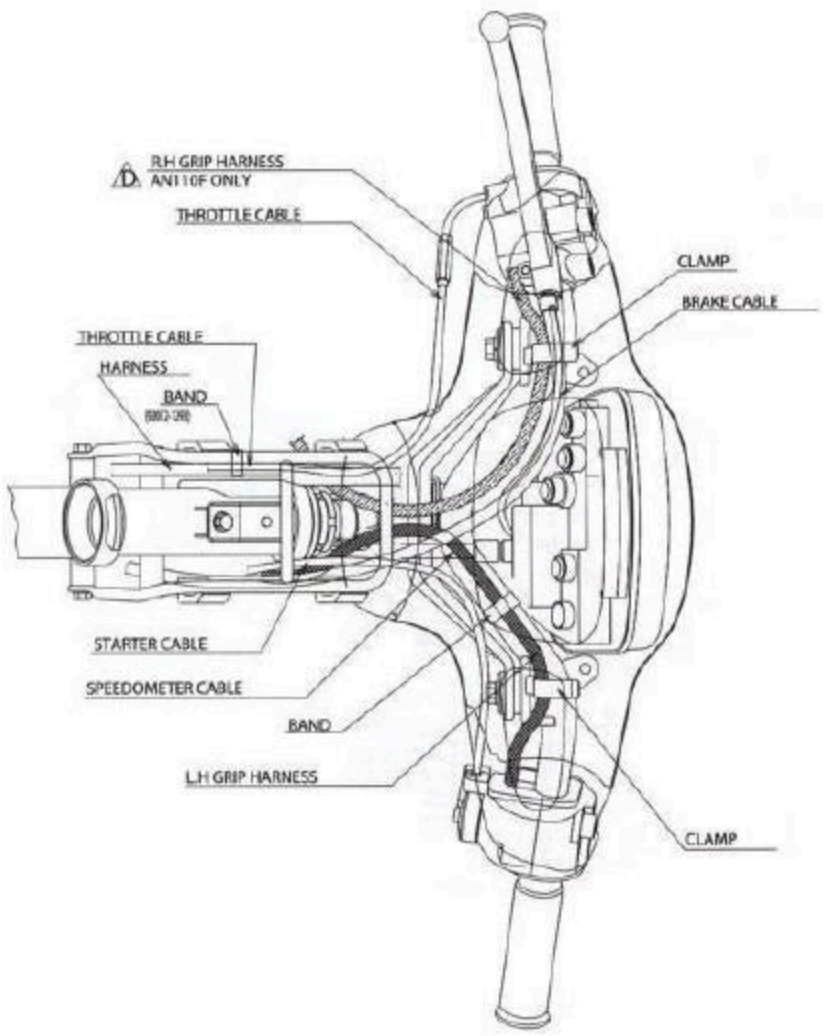
Cable, Wire and Hose Routing

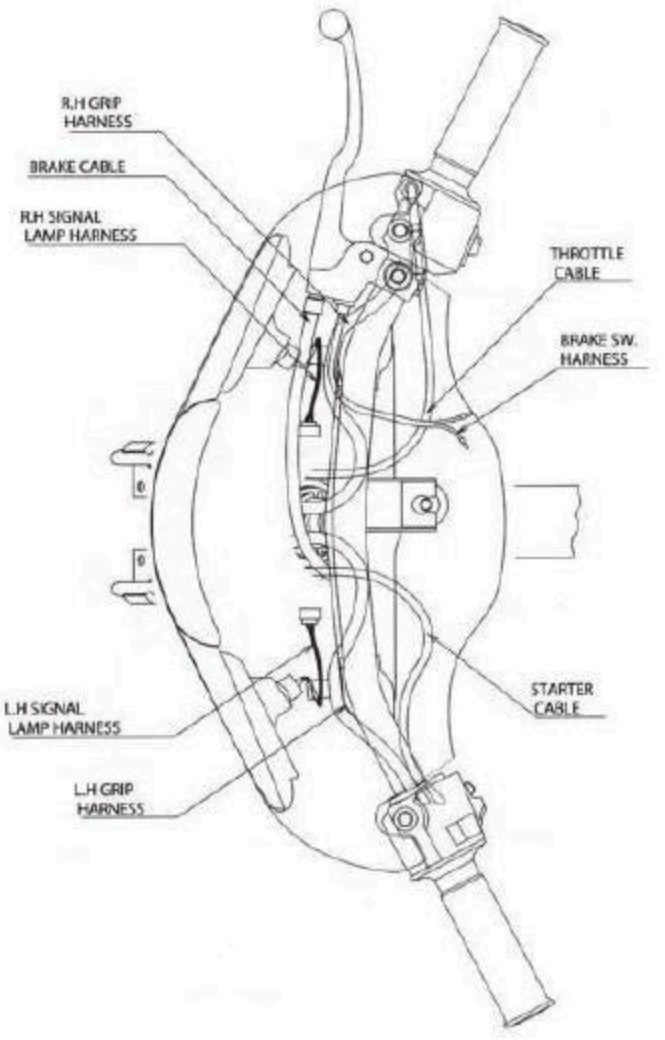
ROUTING OF CABLE-SPEEDOMETER & CABLE BRAKE



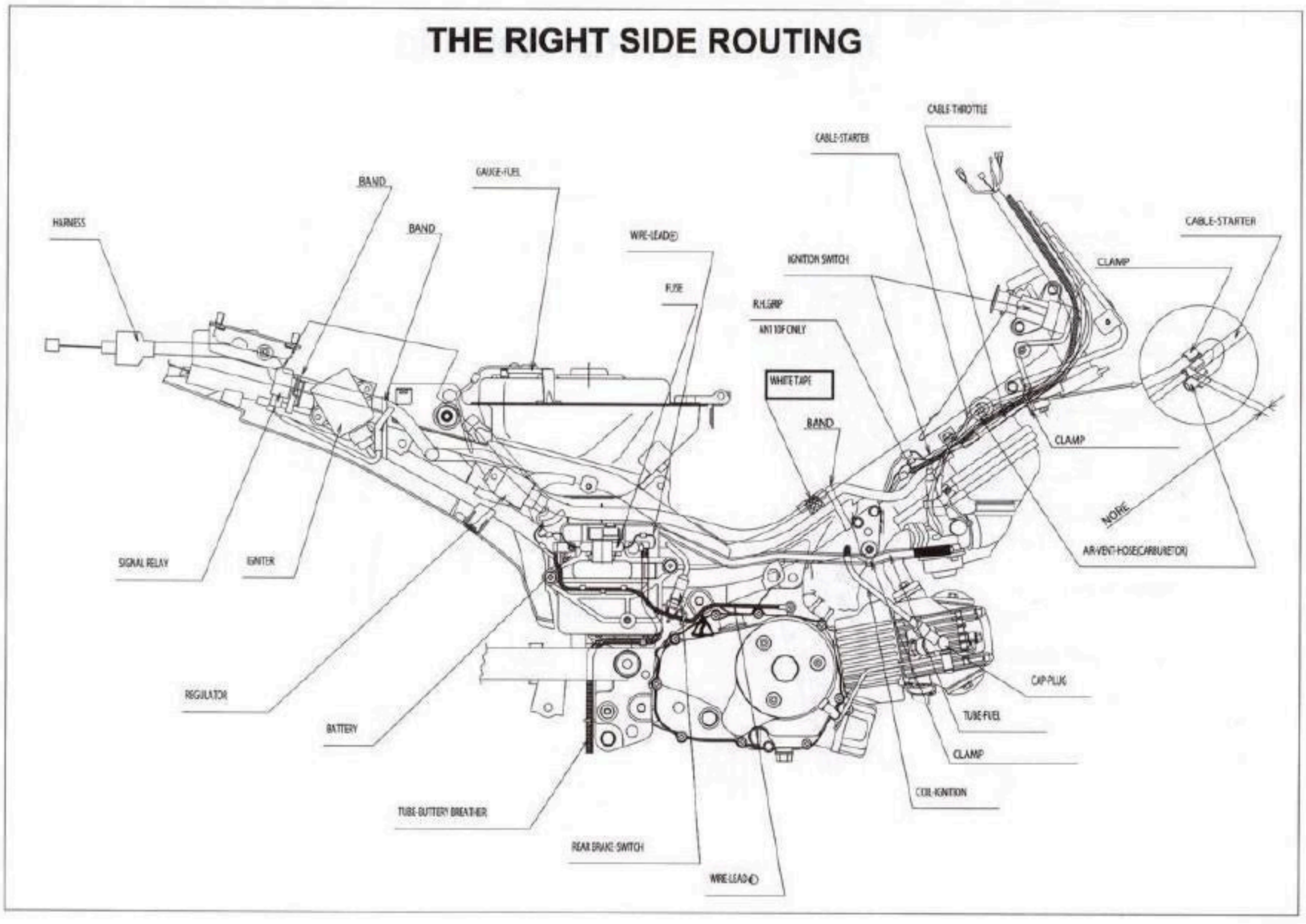
Cable, Wire and Hose Routing

THE HANDLE AREA ROUTING



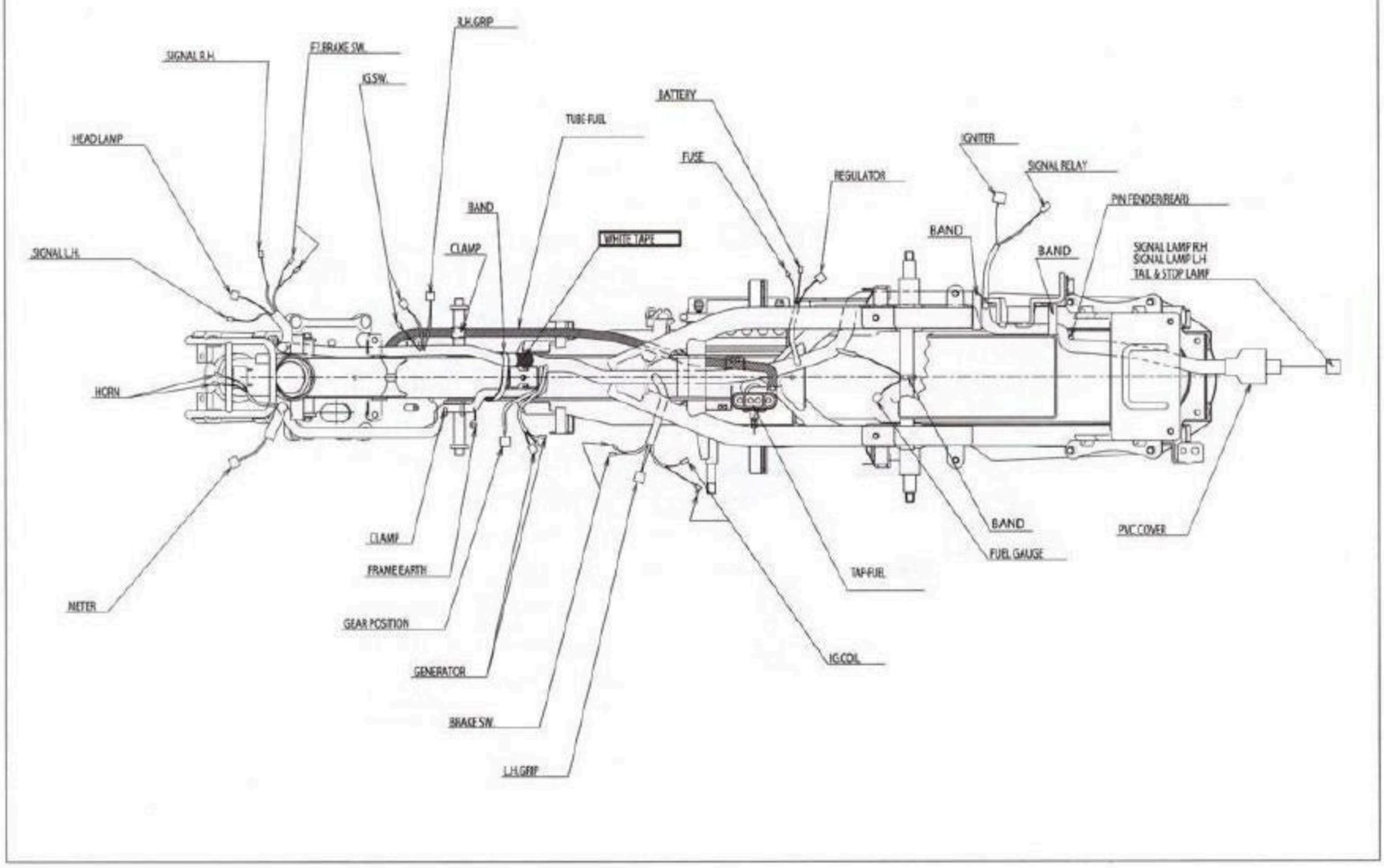


Cable, Wire and Hose Routing



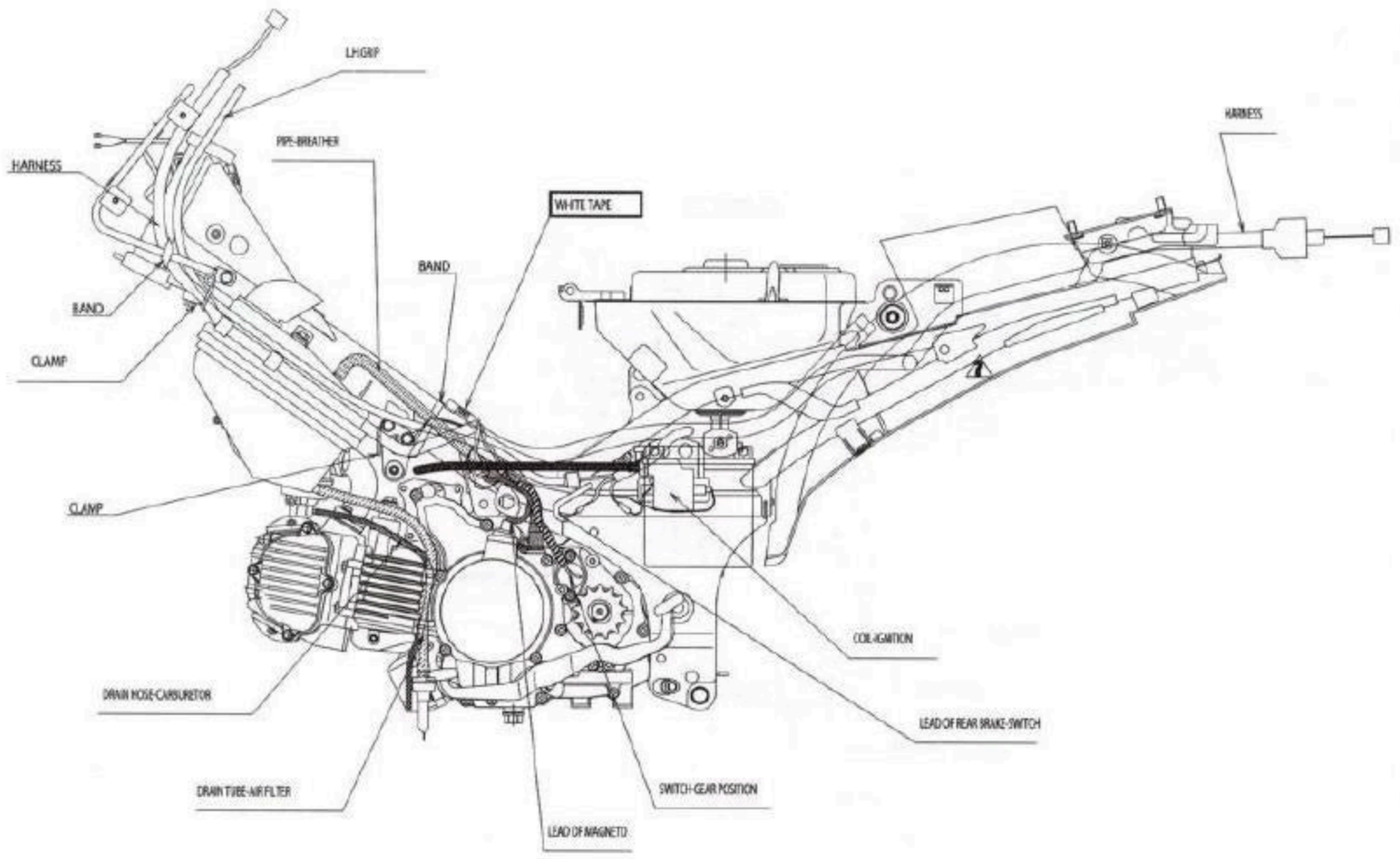
Cable, Wire and Hose Routing

THE UPPER ROUTING



Cable, Wire and Hose Routing

THE LEFT SIDE ROUTING



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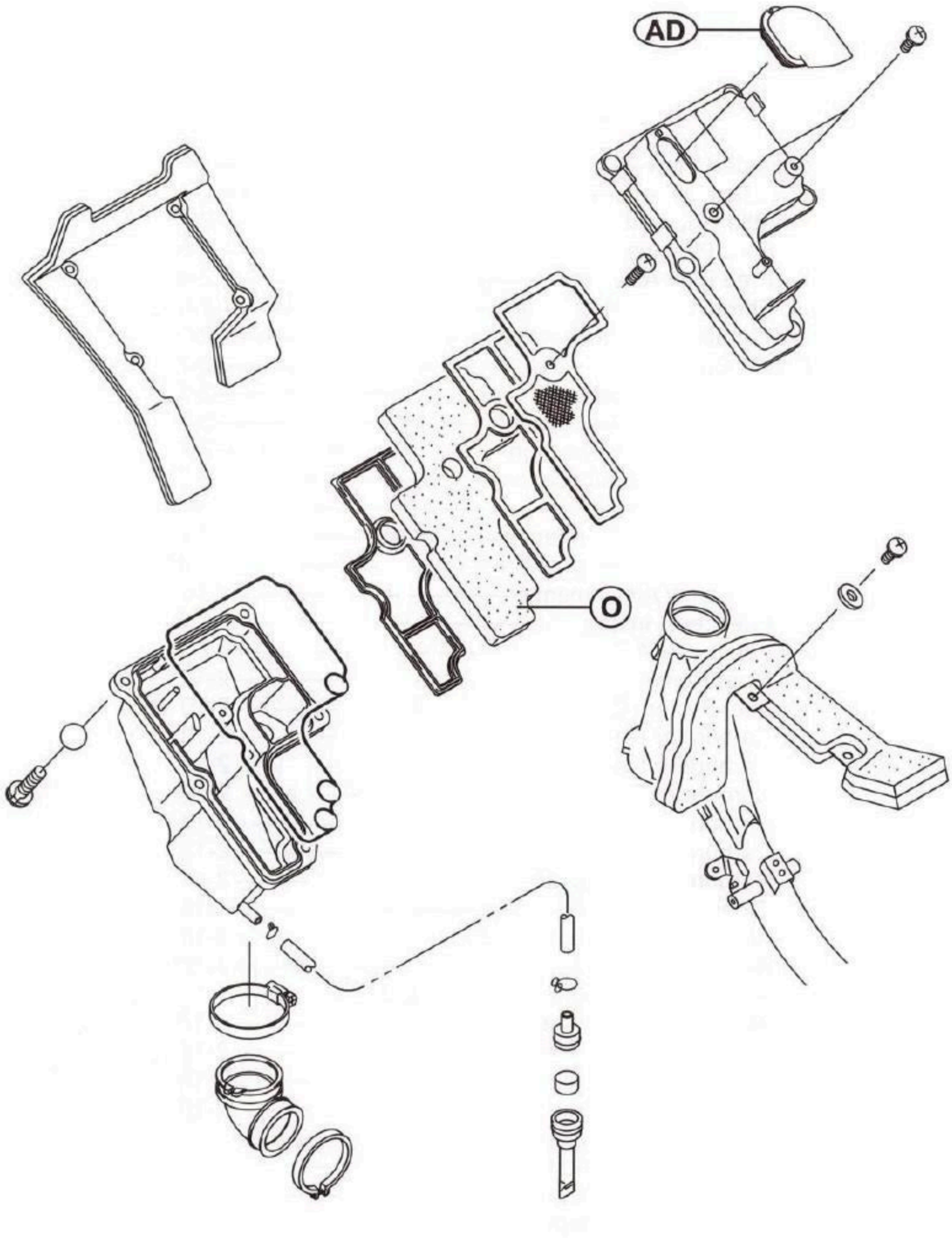
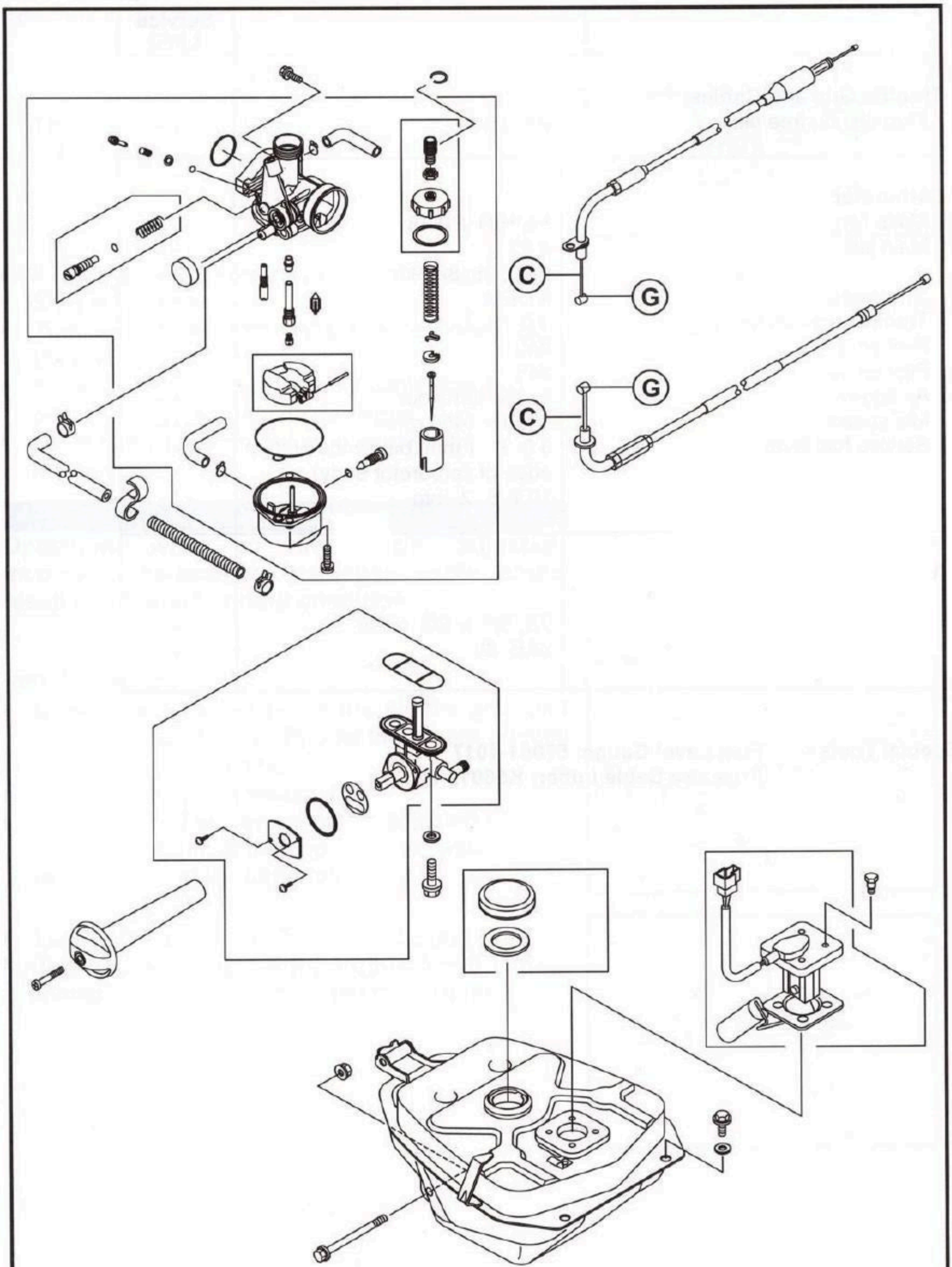
Exploded View



AD. Apply adhesive.
O. Apply oils.

Exploded View



C. Apply cables lubricant.
G. Apply greases.

2-4 FUELSYSTEM

Specifications

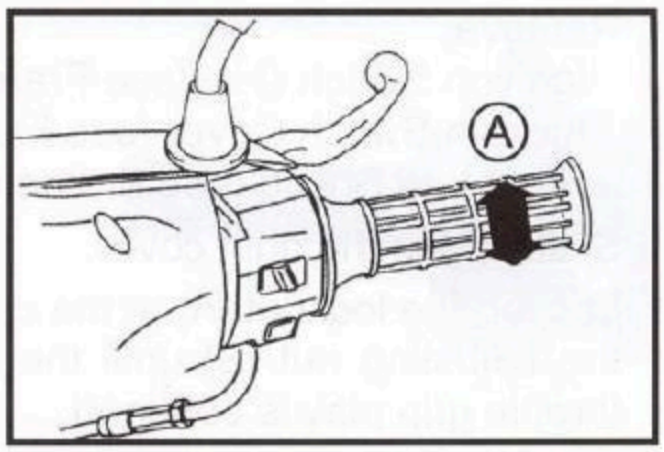
Item		Standard	Service Limit
Throttle Grip and Cables:			
Throttle grip free play		2 ~ 3 mm	- - -
Carburetor:			- - -
Make / type		KEIHIN PB 18	- - -
Main jet:	Standard	# 82	- - -
	Option	# 80, 85, 88, 90	- - -
Jet needle		4JJEM	- - -
Throttle valve cutaway		3.0	- - -
Pilot jet (1) :		#45	- - -
Pilot jet (2)		#45	- - -
Air screw		1 3/4 turns out	- - -
Idle speed		1350 ~ 1450 rpm	- - -
Service fuel level		3.0 ± 1 mm (below the bottom edge of carburetor body)	- - -
Float height		10.7 ± 2 mm	- - -
Air Cleaner:			
Air cleaner element oil:			
	Grade	SE, SF or SG class	- - -
	Viscosity	SAE 30	- - -

Special Tools - **Fuel Level Gauge: 57001-1017**
Pressure Cable Luber: K56019-021

Throttle Grip and Cable

Free Play Inspection

- Check throttle grip free play [A].
- ✱ If free play is incorrect, adjust it.



Throttle Grip Free Play
2 ~ 3 mm

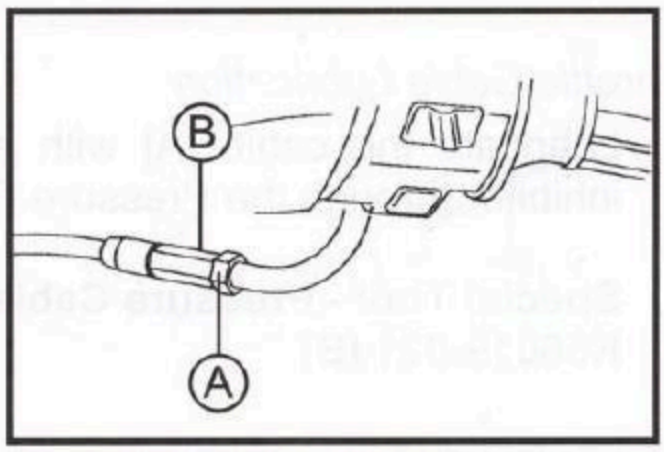
- ✱ If the free play is correct, make the following test.
- Start the Engine
- Turn the handlebar from side to side while idling the engine.
- ✱ If idle speed varies, the throttle cable may be poorly routed or it may be damaged.
- Correct any problem before operating the motorcycle.

⚠ WARNING

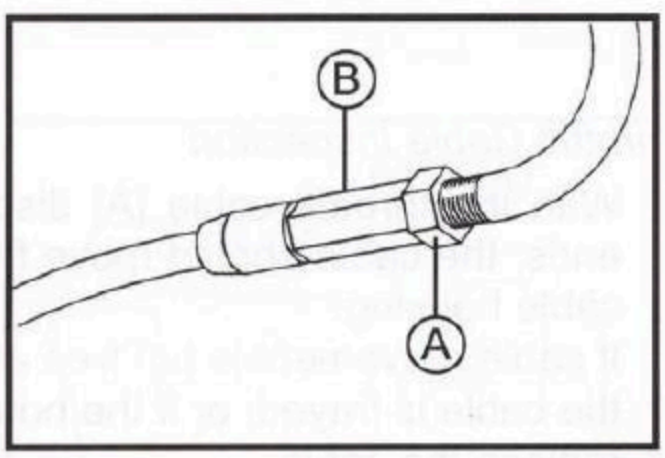
Operation with an improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.

Free Play Adjustment

- Loosen the lock nut [A] at the throttle grip, and turn the adjusting nut [B] until the proper amount of free play is obtained.
- Tighten the locknut securely.
- ✱ If the throttle grip play cannot be adjusted with the adjusting nut at the grip, use the cable-adjusting nut at the carburetor.



- Loosen the locknut [A] at the throttle grip.
- Turn the adjusting nut [B] so that 5 ~ 6 mm of threads are visible, and tighten the lock nut.

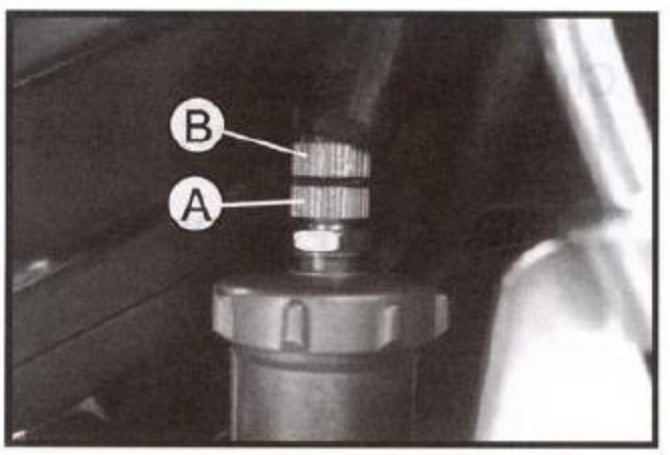


Throttle Grip and Cable

- Remove:
  Ignition Switch Cap (see Frame chapter)
  Ignition Switch Cover (see Frame chapter)
  Right Leg Shield (see Frame chapter)
- Slides back the dust cover.
- Loosen the locknut [A] at the carburetor, and turn the adjusting nut [B] until the proper amount of throttle grip play is obtained.
- Tighten the locknut securely.
- Start the engine.
- Adjust the idle speed.
- Turn the handlebar from side to side while idling the engine.

★ If idle speed varies, the cable may be poorly routed or it may damaged.

- Correct any problem operating the motorcycle.



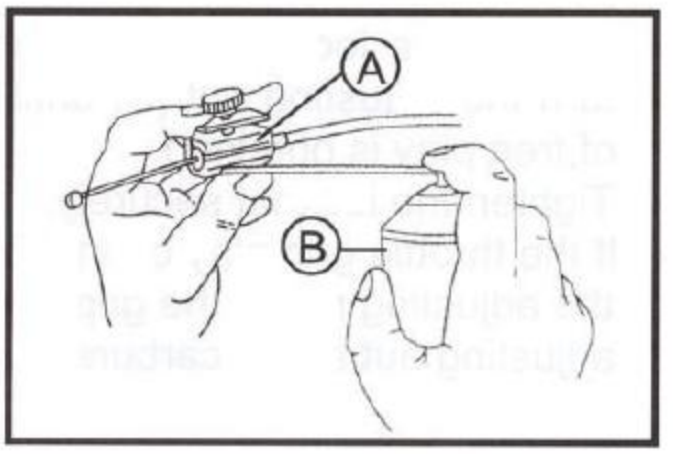
⚠ WARNING

Operation with an improperly adjusted, incorrectly routed, or damage cable could result in an unsafe riding condition.

Throttle Cable Lubrication

- Lubricate the cable [A] with a penetrating rust inhibitor through the Pressure Cable Luber.

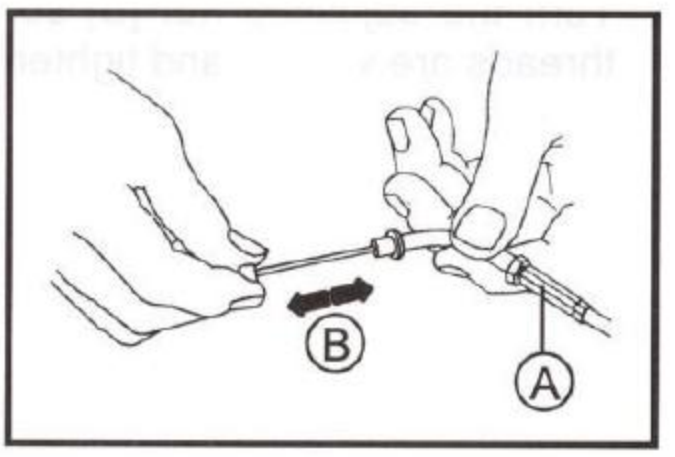
Special Tool - Pressure Cable Luber:
K56019-021 [B]



Throttle Cable Inspection

- With the throttle cable [A] disconnected at both ends, the cable should move freely [B] within the cable housing.

★ If cable movement is not free after lubricating, if the cable is frayed, or if the housing is kinked, replace the cable.



Choke cable

Free Play Inspection

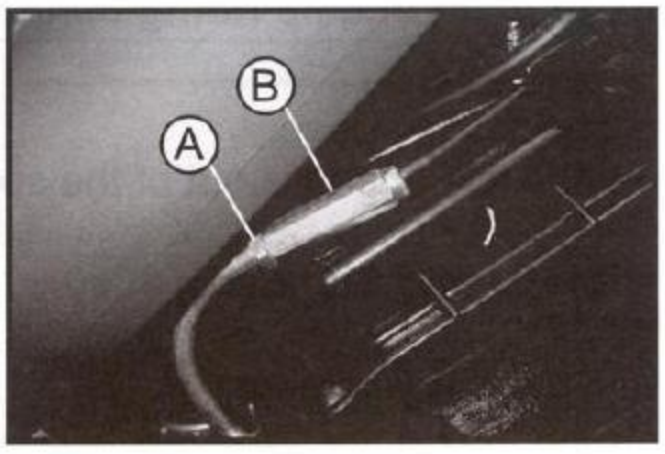
- Check the choke cable free play [A].
  - o Push the choke lever back all the way to its released position.
  - o Determine the amount of choke cable play at the left switch housing. Pull out and push in the cable housing [B], the amount of cable travel is the amount of cable free play.

Choke Cable Free Play 2 ~ 3 mm

★ If the free play is incorrect, adjust the choke cable.

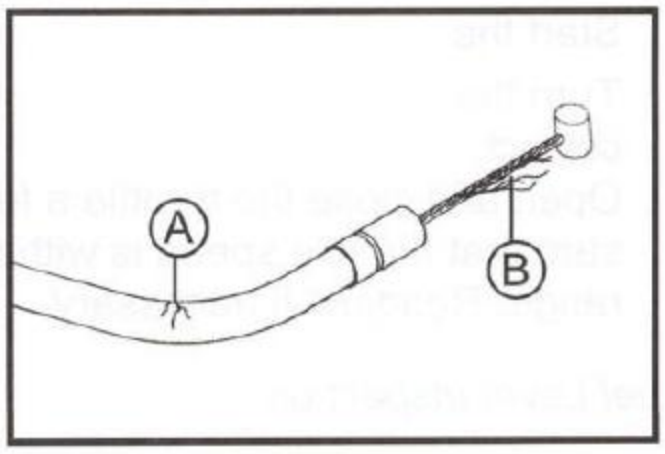
Choke Cable Adjustment

- Remove the right leg shield (see Frame chapter).
- Loosen the lock nut [A] at the choke cable adjusting nut [B], and turn the adjusting nut until the cable has the proper amount of play.
- Tighten the lock nut securely.



Choke Cable Inspection

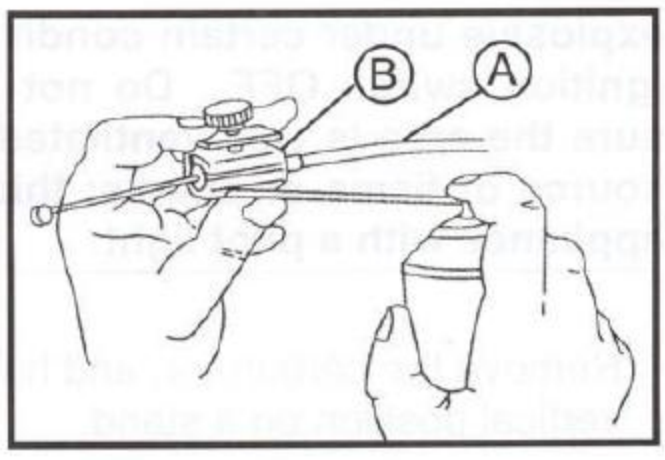
- Check that the choke inner cable slides smoothly by moving the choke lever. To inside or out side.
  - o If there is any irregularity, with the choke cable disconnected at the both ends, the cable should move freely within the cable housing.
- ★ If cable movement is not free after lubricating, if the cable is frayed [A], or if the housing is kinked [B], replace the cable.



Choke Cable Lubrication

- Lubricate the cable with a penetrating rust inhibitor through the Pressure Cable Luber.
  [A] Cable

Special Tool - Pressure Cable Luber:
K56019-021 [B]



Carburetor

Idle Speed Adjustment

- Start the engine and warm it up thoroughly.
- Turn the handlebar from side to side while idling the engine.

★ If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of these conditions before riding.

⚠ WARNING

Operation with an improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.

- Check idle speed.

★ If the idle speed is out of the specified range, adjust it.

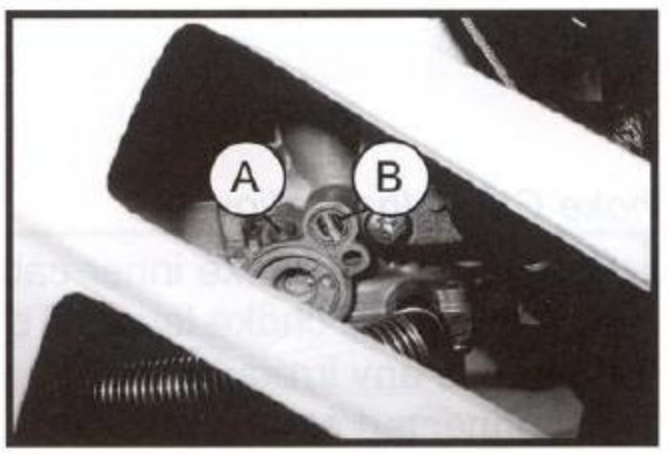
Idle Speed Standard: 1350 ~ 1450 rpm

Idle Speed Adjustment

○ First turn in the air screw [A] until it seats lightly, and back it out 1¾ turns.

- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [B] until idle speed is correct.

○ Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.



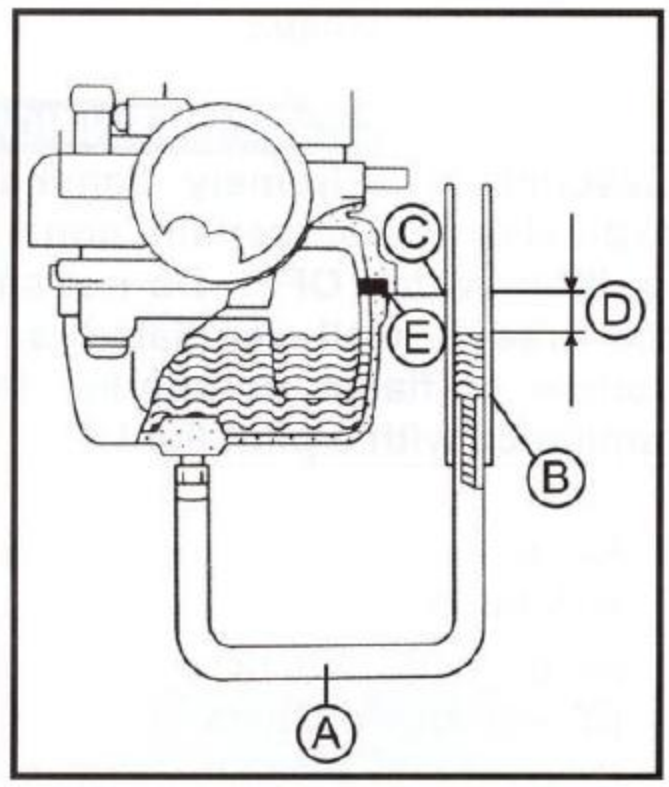
Fuel Level Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetor, and hold them in true vertical position on a stand.

Carburetor



- Put the fuel tank on a bench, and connect the fuel tap to the carburetor using a suitable hose.
- Prepare a rubber hose (6 mm in diameter and about 300 mm long) [A].
- Connect the fuel gauge [B] to the carburetor float bowl with the rubber hose.
  Special Tool - Fuel Level Gauge: 57001-1017
- Hold the gauge vertically against the side of the carburetor body so that the "middle" lines [C] is several millimeters higher than the bottom edge of the carburetor body.
- Turn the fuel tap to the ON position to feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.
- Wait until the fuel level [D] in the gauge settles.
- Keeping the gauge vertical, slowly lower the gauge until the "middle" line is even with the bottom edge [E] of the carburetor body.

NOTE

O *Do not lower the "middle" line below the bottom edge of the carburetor body. If the gauge is lowered and then raised again, the fuel level measure shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of it into suitable container and start the procedure over again.*

- Read the fuel level in the gauge and compare it to the specification.
  Fuel Level
  3.0 ± 1 mm below the bottom edge of carburetor body

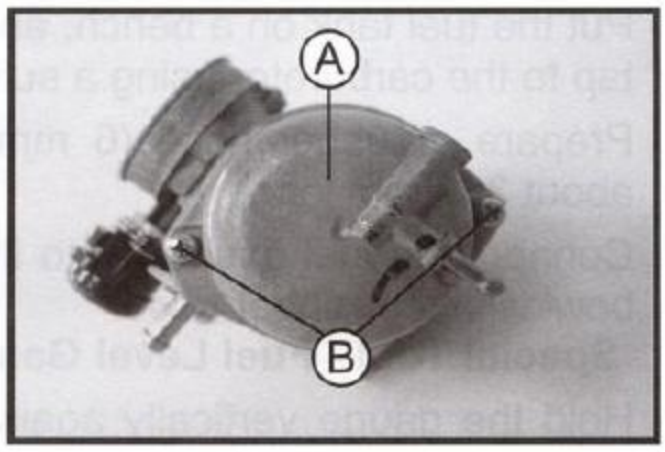
- Screw in the carburetor drain plug.
- Turn the fuel tap to the OFF position and remove the fuel level gauge.

★ If the fuel level is incorrect, the float level cannot be adjusted on this model. Inspect the float, float valve needle, and the contacting surface between the carburetor body and its float valve needle. If they are damaged, replace them.

•□ Install the carburetor.

Carburetor

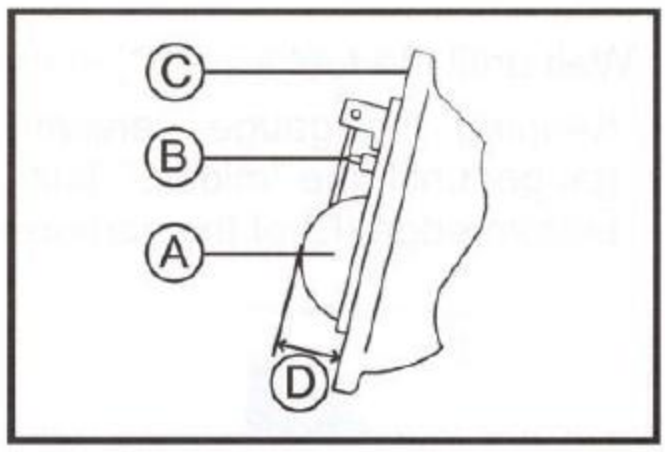
Fuel Level Adjustment



⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetor, drain the fuel into a suitable container.
- Remove the float bowl [A] taking out the screw [B] with lock washers.
- Check the float level.
  [A] Float
  [B] Float Valve Needle Rod (contacted but unloaded).
  [C] Float bowl-mating surface
  [D] Float height
  Float Height
  10.7 ± 2 mm



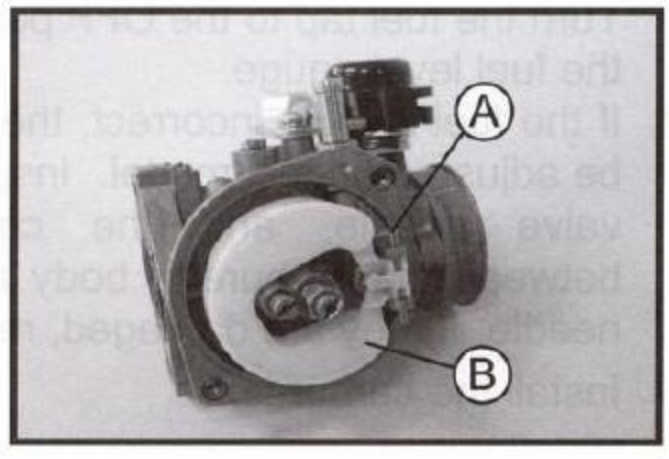
★ If the float height is incorrect, the float height can not be adjusted on this model. Inspect the float, float valve needle, and the contacting surface between the carburetor body and its float valve needle. If they are damaged, replace them.

NOTE

- *Float height is the distance from the float bowl-mating surface of the carburetor body (with the gasket removed) to the top of the float.*
- *Do not push the needle rod in during the float height measurement. Measurement the height with the carburetor upside down.*

Float Removal

- Remove the carburetor and disassembly the float bowl.
- Drive out the pivot pin [A] and remove the float [B] and float valve as a set.



Carburetor

Fuel System Cleanliness Inspection

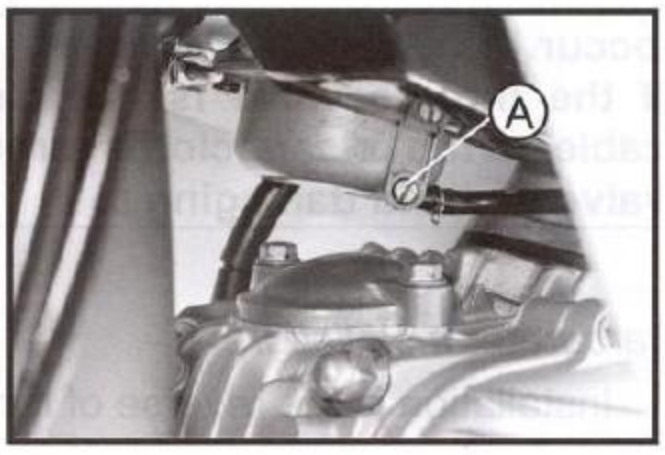
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.
Make sure the engine is cold before working.
Wipe any fuel off the engine before starting it.

- Using a screwdriver, turn out the drain plug [A] a few turns and drain the carburetor to a suitable container and check to see if water or dirt comes out.

★ If any water or dirt appears during the above inspection, clean the fuel system.

- Tighten the drain plug securely.



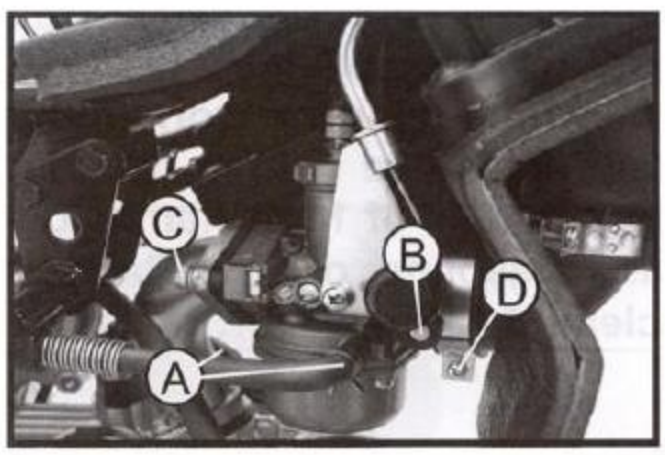
Carburetor Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

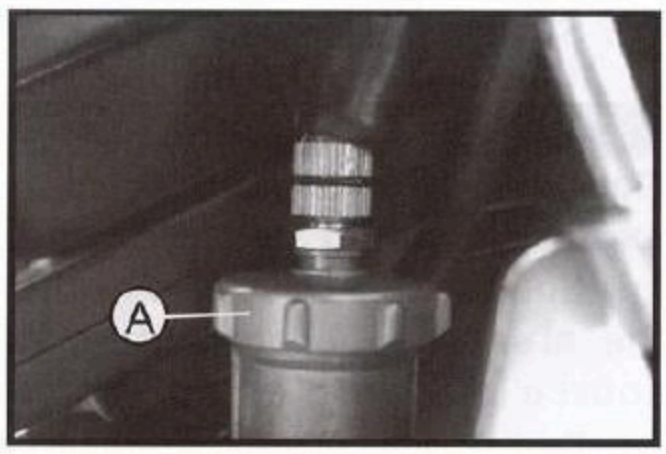
- Turn the fuel tap to the OFF position.

- Remove:
  Right Leg Shield (see Frame chapter)
  Tubes (carburetor side) [A]
  Choke Cables Lower End [B]
  Intake Pipe Bolts [C]
- Loosen the clamp screws [D].
- Remove the carburetor.
- Stuff pieces of lint-free, clean cloths into the carburetor holder and the air cleaner intake duct to keep the dirt out of the engine and air cleaner.



Carburetor

- Unscrew the cap [A] and pull out the throttle cable lower end with the throttle valve, spring and jet needle as a set.



⚠ WARNING

If dirt or dust allowed passing through into the carburetor, the throttle may become stuck, possibly causing an accident.

CAUTION

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.
If the throttle valve is not removed from the cable, wrap clean cloths around the throttle valve to avoid damaging to it.

Carburetor Installation

- Installation is the reverse of removal.
- After installing the carburetor, perform the following.

o Check fuel leakage from the carburetor.

⚠ WARNING

Fuel spilled from the carburetor is hazardous.

o Adjust the following.
  Idle Speed
  Throttle Grip Free Play

Carburetor Cleaning

⚠ WARNING

Clean the carburetor in a well-ventilated area, and take care that there is no spark or flames anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of high flammable liquids, do not use gasoline or low flash-point solvents to clean the carburetor.

Carburetor

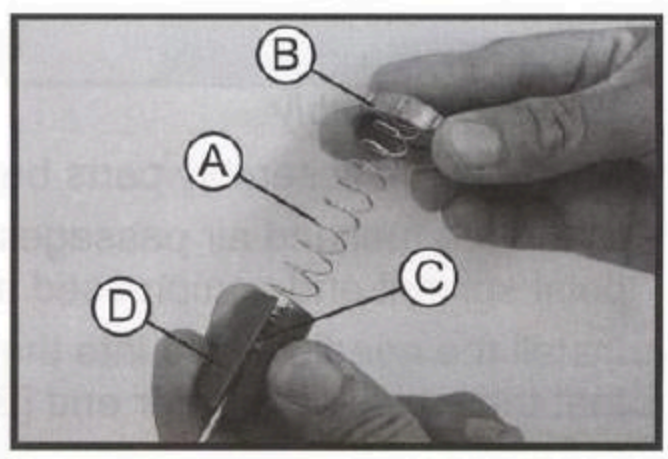
CAUTION

Do not use compressed air on an assembled carburetor, or the pressure may deform the float.
Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution.
This will prevent damage to or deterioration of the parts.
Do not use a strong carburetor cleaning solution which could attack the plastic parts; instead, use a mild high flash-point cleaning solution safe for plastic parts.
Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

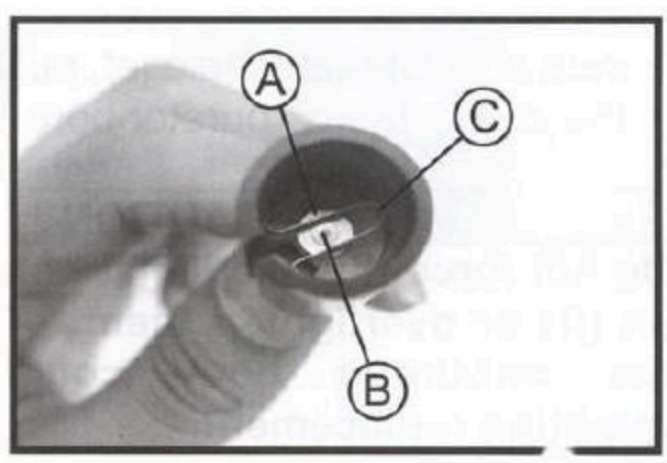
- Disassemble the carburetor.
- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetor.

Carburetor Disassembly

- Remove the carburetor.
- Pull the whole of spring [A] to the cap [B] side and hold it.
- Take out the cable lower end [C] from the throttle valve assembly [D].



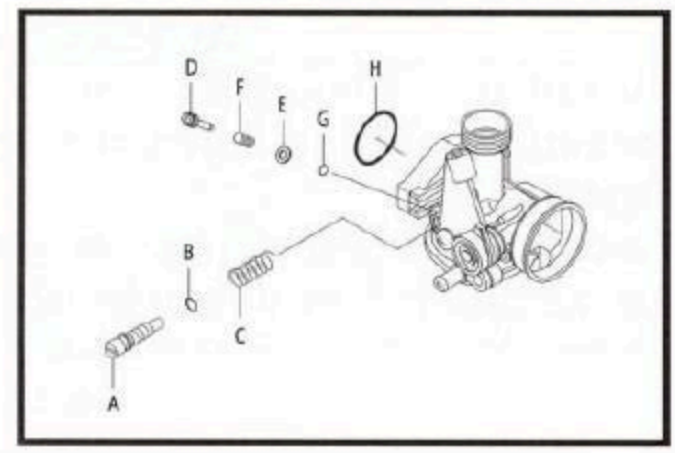
- Pull out the circlip [C] and plate [A] with jet needle [B].



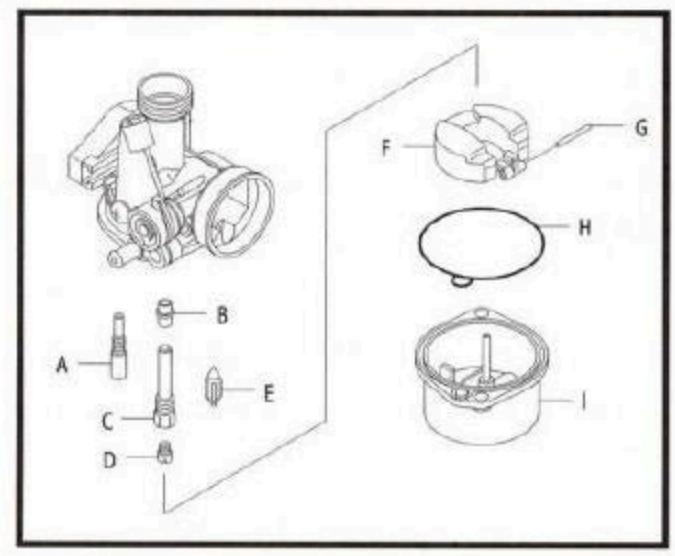
Carburetor

- Remove the following parts from the carburetor body.

  Idle Adjusting Screw [A]
  O-ring [B]
  Spring [C]
  Air Screw [D]
  O-ring [E]
  Spring [F]
  Washer [G]
  O-ring [H]

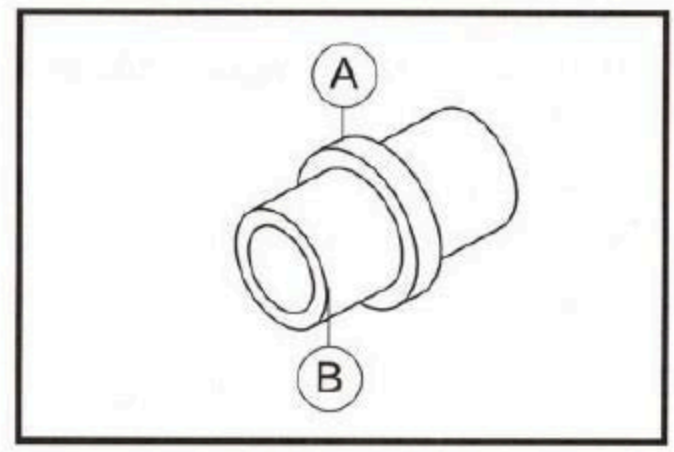


  Pilot Jet [A]
  Needle Jet [B]
  Needle Jet Holder [C]
  Main Jet [D]
  Float Valve Needle [E]
  Float [F]
  Pin [G]
  O-ring [H]
  Float Bowl [I]

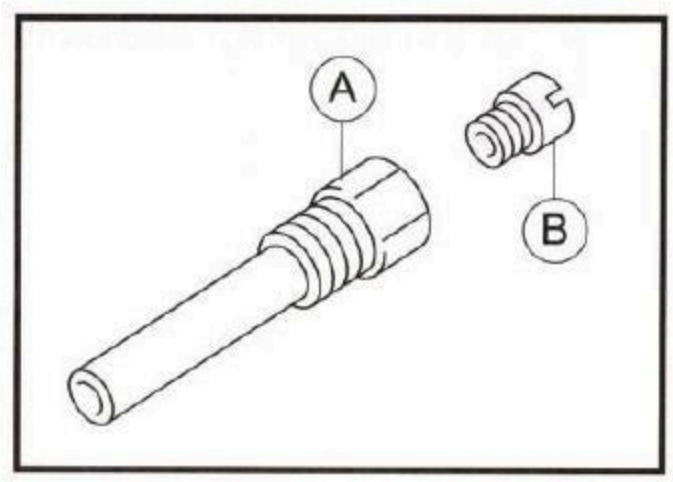


Carburetor Assembly

- Clean the disassembly parts before assembling.
- Clean the fuel and air passages with a high flash point solvent and compressed air.
- Install the needle jet [A] into the carburetor so that the smaller diameter end [B] of the jet goes in first.



- Carefully screw in the needle jet holder. It will seat against the needle jet, pushing the end of the jet into the carburetor bore.

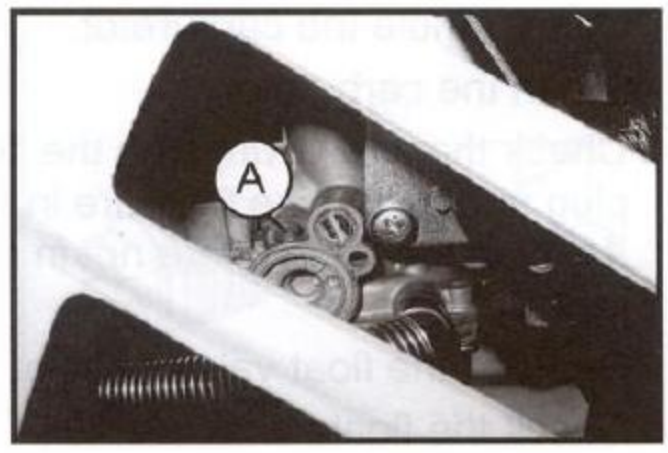


CAUTION
Do not force the needle jet holder [A] and main jet [B] or overtighten them. The needle jet or the carburetor body could be damaged requiring replacement.

Carburetor

- Turn in the air screw [A] fully but not tightly, and then back it out 1¾ turns.
- After installing the carburetor, do the following.

o Check the fuel leakage.
o Adjust the following items if necessary.
Throttle grip free play.
Idle speed.



Carburetor Inspection

⚠ WARNING

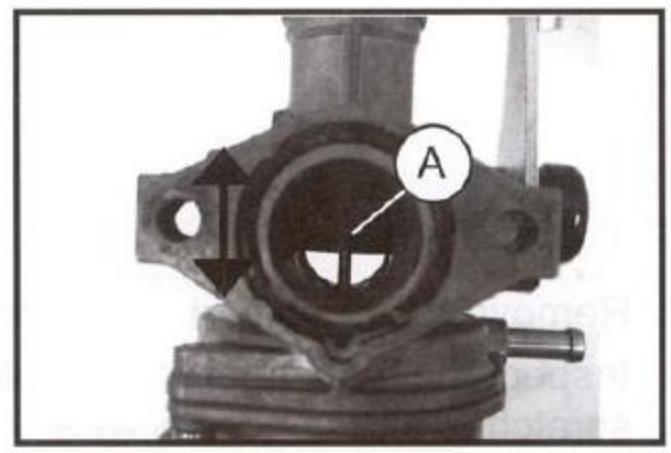
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetor.
- Before disassembling the carburetor, check the fuel level.

★ If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.

- Check that the throttle valve [A] moves smoothly and return back with the spring tension. The surface of the valve must not be excessively worn.

★ If the throttle valve does not move smoothly, or if it is very loose in carburetor body. Replace the carburetor.
★ If the spring tension is weak, replace it.

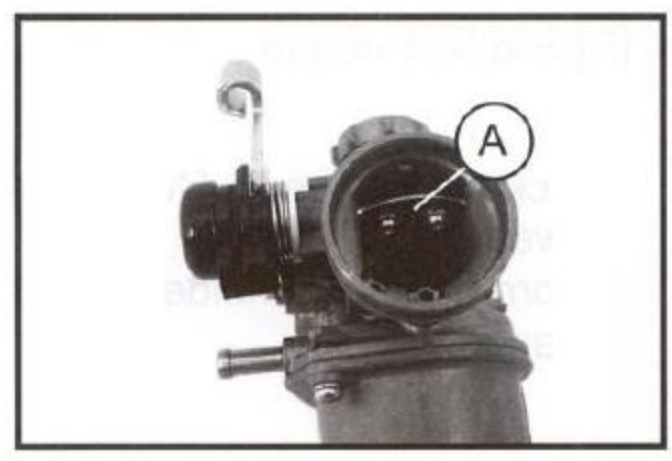


- Turn the starter cable bracket to check that the starter butterfly, valve [A] move smoothly and return with spring tension.

★ If the starter butterfly valve do not move smoothly, replace the carburetor.

NOTE

o *Do not remove the airscrew from the carburetor or change the airscrew setting, or you will lose the best setting.*



Carburetor

- Disassemble the carburetor.
- Clean the carburetor.
- Check that the O-rings on the float bowl, drain plug and the intake pipe are in good condition.

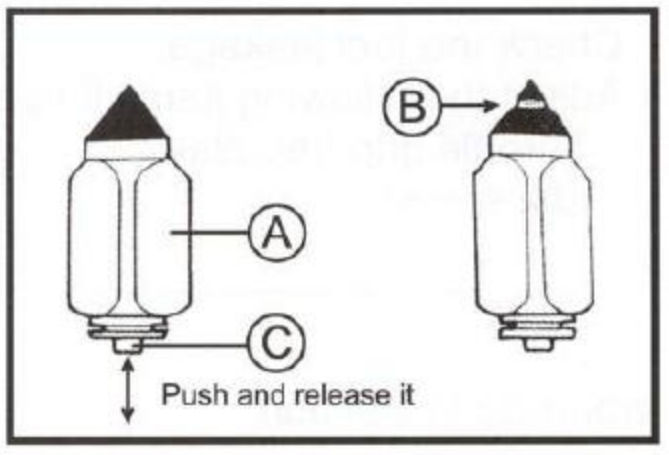
★ If any of the O-rings are not in good condition, replace them.

- Remove the float valve needle.
- Check the float valve needle [A].

★ If the needle is worn [B] as shown in the figure, replace the valve needle.

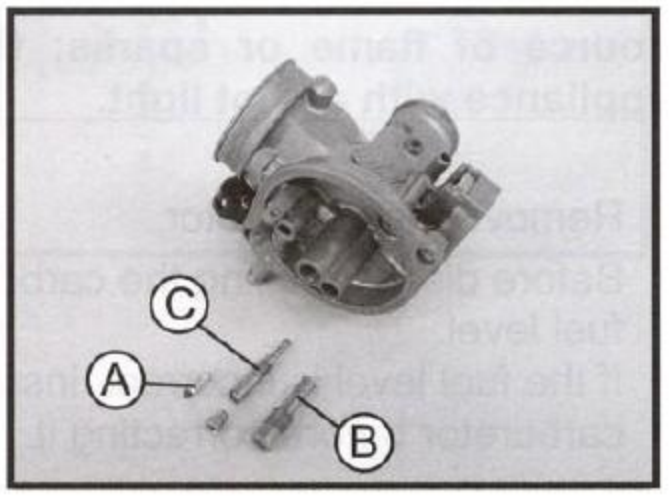
- Push the rod [C] in the valve needle, and then release it.

★ If the rod does not spring out, replace the valve needle.



- Check the main jet [A], main jet holder [B] and pilot jet [C] for any damage.

★ If they are damaged, replace them with new ones.



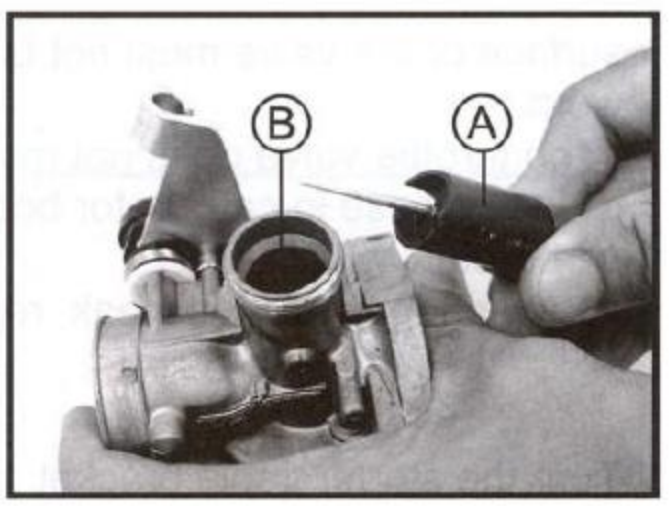
- Remove the throttle valve [A] and jet needle.
- Inspect the outside of the throttle valve for scratches and abnormal wear.

★ If the valve is badly scratched or worn, replace it.

- Inspect the inside of the carburetor body for these same faults.

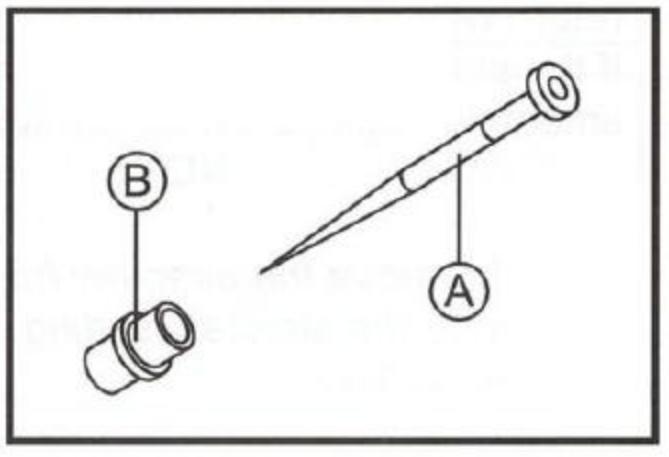
★ If it is badly scratched or worn, replace the entire carburetor.

[B] Sliding Surface.



- Check the jet needle [A] and needle jet holder [B] for wear.

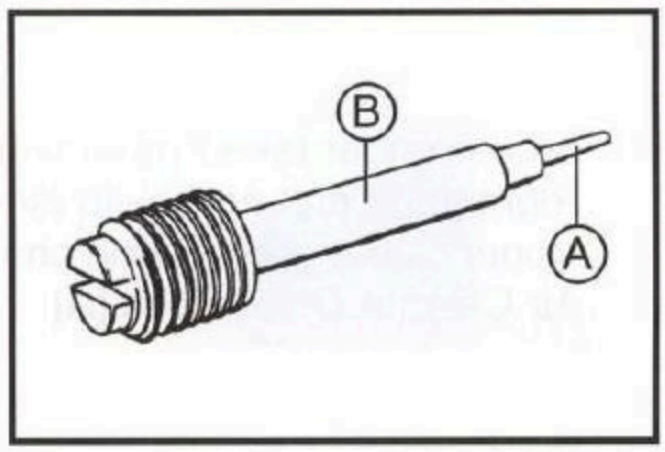
★ A worn needle jet holder or jet needle should be replaced.



Carburetor

- Check the tapered portion [A] of the pilot screw [B] for wear or damage.

★ If the pilot screw is worn or damaged on the tapered portion it will prevent the engine from idling smoothly. Replace it.



- Disassemble the carburetor, and clean the fuel, air passages with a high flash-point solvent and compressed air.
- Stuff the lint-free, clean cloths into the air cleaner housing to keep dirt or other foreign material from entering.

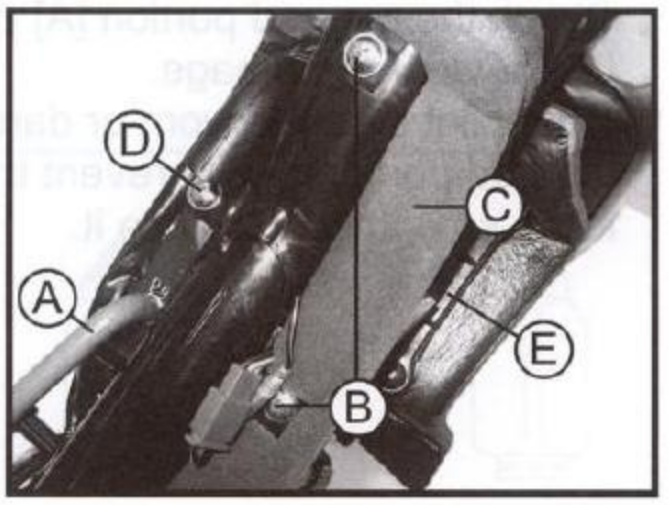
⚠ WARNING

If dirt or dust is allowed to pass through into the carburetor, the throttle valve may become stuck, possibly causing an accident.

Air Cleaner

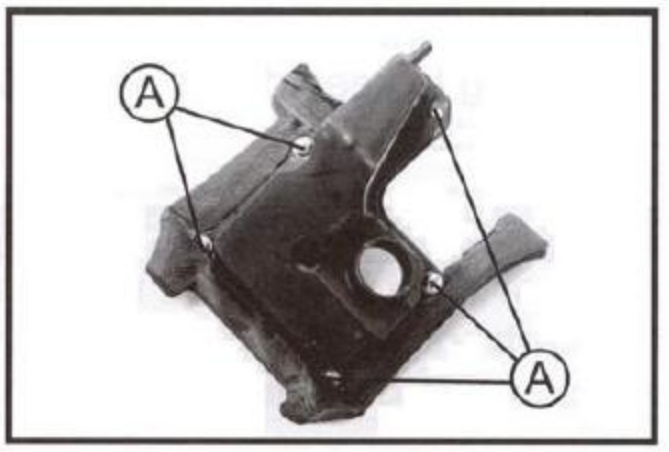
Air Cleaner Element Removal

- Remove:
  Front Fender (see Frame chapter)
  Right and Left Leg Shield (see Frame chapter)
  Upper Cover (see Frame chapter)
  Air Cleaner Drain Hose [A]
  Vacuum Hose [B]
  Dust Shroud Screws [B]
  Dust Shroud [C]
  Air Cleaner Housing Mounting Screws [D]

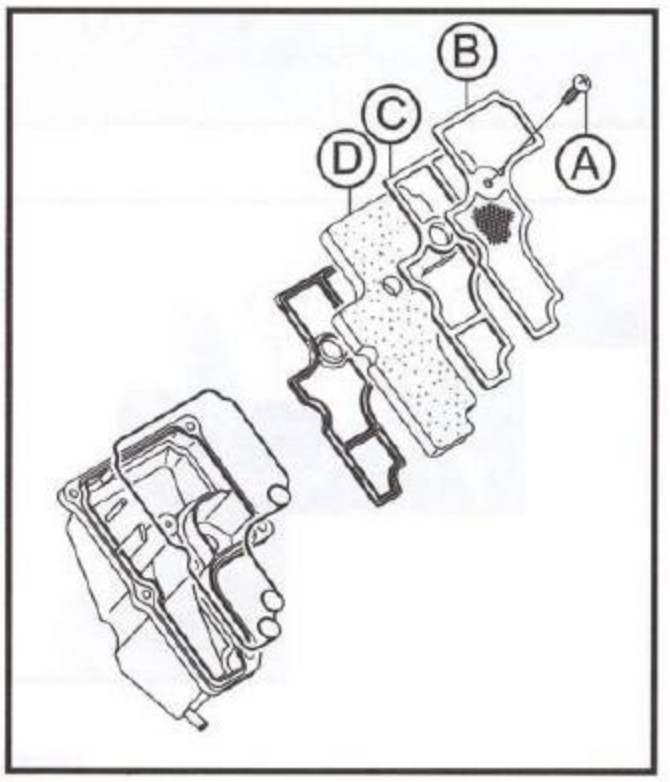


- Loosen the clamp.
- Remove the air cleaner housing [E]

- Remove :
  Air Cleaner Housing Screws [A]



- Remove:
  Element Mounting Screw [A]
  Element Holder Screen [B]
  Element Holder [C]
  Element Holder [D]



- After removing the air cleaner, cover the carburetor with pieces of lint-free, clean cloth to keep dirt out of the engine and carburetor.

⚠ WARNING

If dirt or dust is allowed to pass through into the carburetor, the throttle valve may become stuck, possibly causing an accident.

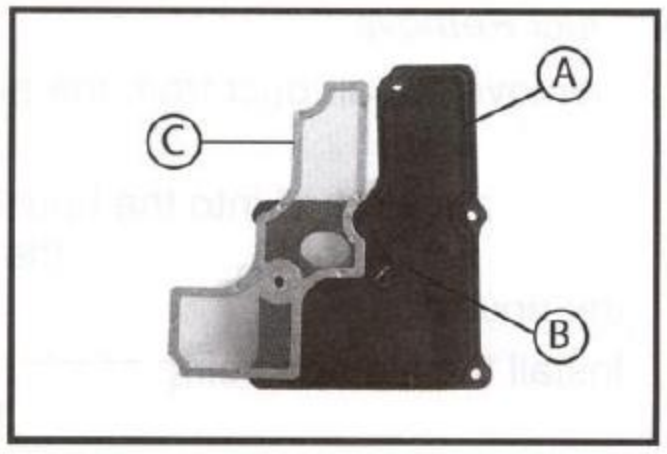
CAUTION

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

Air Cleaner

Air Cleaner Element Installation

- Install the element [A].
- Install the holder [B] and holder screen [C].
- Install the other removed parts.



Air Cleaner Element Inspection and Cleaning

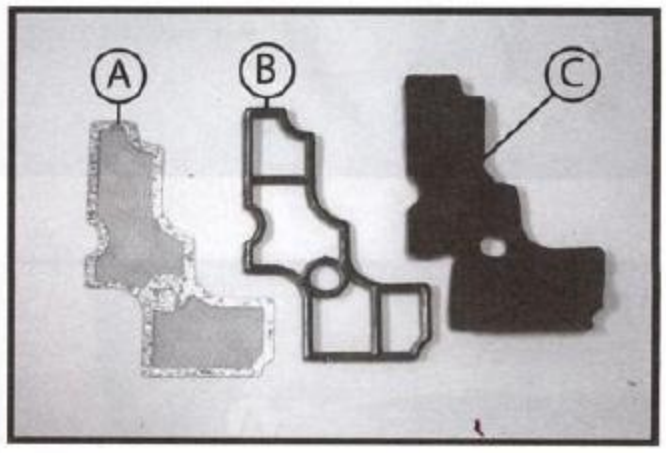
NOTE

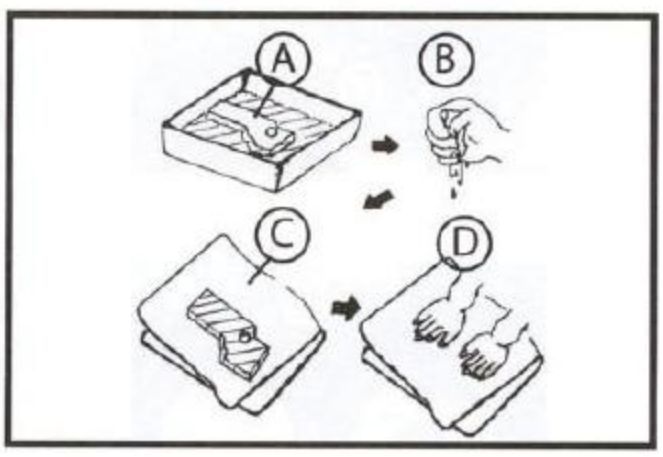
- o *In dusty areas, the element should be cleaned more frequently than the recommended interval.*
- o *After riding through rain or on muddy roads, the element should be cleaned immediately.*

⚠ WARNING

Clean the element in a well-ventilated area, and make sure that there is no spark or flame near the working area. Because of the danger or highly flammable liquids, do not use gasoline or low flash-point solvents to clean the element.

- The damaged part must be replaced or it will allow dirt into the carburetor.
  Holder Screen [A]
  Holder [B]
  Element [C]
- Remove the air cleaner element (see Air Cleaner Element Removal).
- Clean the element in a bath of a high flash-point solvent, and then dry it with compressed air or by shaking it.
- After cleaning, saturate the element [A] with SE, SF, or SG class SAE30 oil, squeeze out [B] the excess oil.
- Wrap the element with a clean lint-free cotton towel [C] and compress it [D] several times by hand.
  Oil volume soaked in the oil cleaner element: 5 ± 2 g
- If the element has any tears or breaks, replace the element.

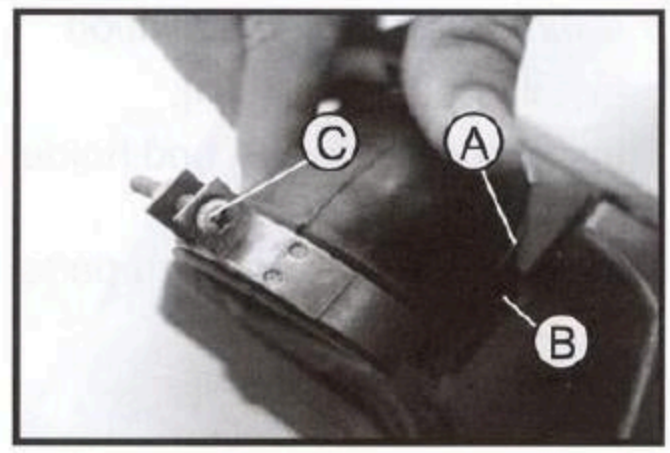




Air Cleaner

Air Duct Removal/Installation

- Remove the air duct from the air cleaner housing.
- Install the air duct into the housing.
  - Fit the slot [A] of the duct to the projection [B] of the housing.
- Install the clamps being careful of the screw position and the screw head [C] direction.



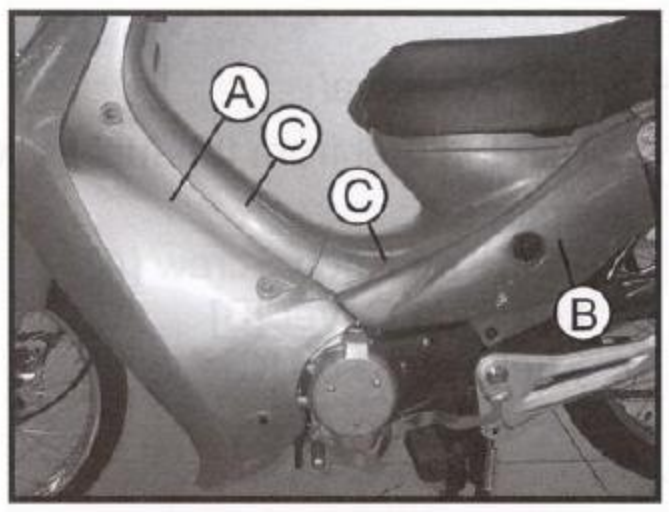
Fuel Tank

Fuel Tank Removal

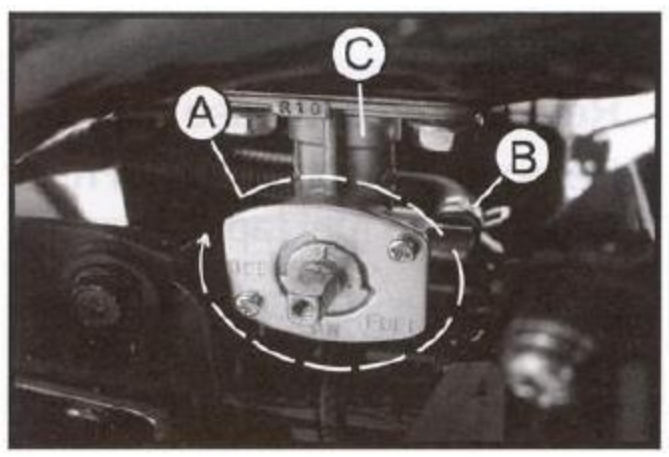
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

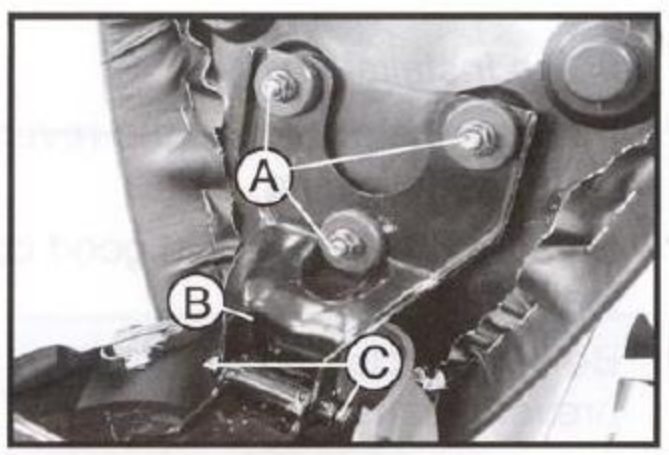
- Remove:
  Leg Shields [A] (see Frame chapter)
  Side Covers [B] (see Frame chapter)
  Front Upper Cover [C] (see Frame chapter)
  Rear Upper Cover [D] (see Frame chapter)



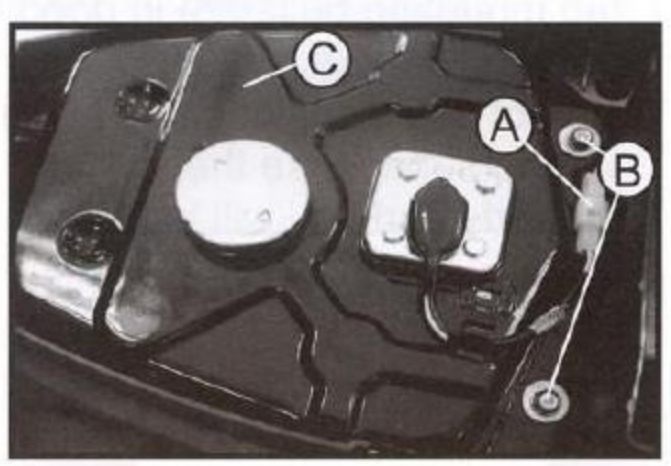
- Check that the fuel tap is in the OFF position [A].
- Remove the fuel hose [B] from the fuel tap [C].



- Remove:
  Seat Mounting Nuts [A]
  Seat Bracket Nut and Bolt [B]
  Seat Bracket [C]



Fuel Level Sensor Lead Connector [A]
Fuel Tank Mounting Bolts and Nut [B]
Fuel Tank [C]



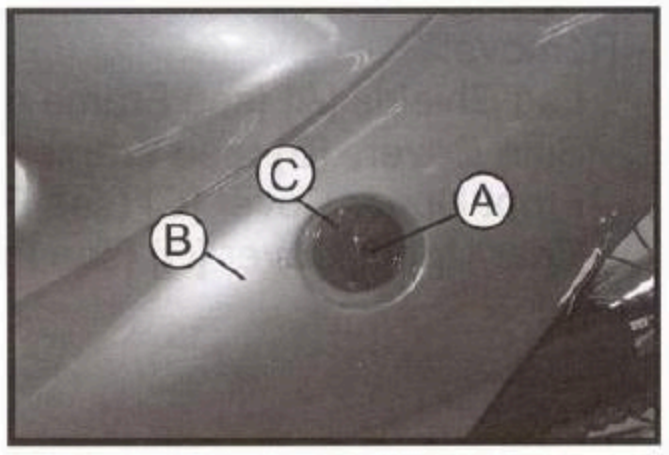
Fuel Tank

Fuel Tank Installation

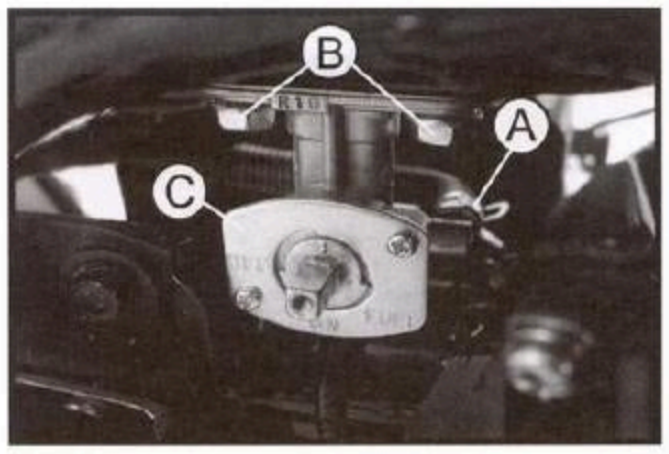
- When installing the fuel tap knob, the projection on the fuel tap shaft must be fit into the groove on the knob.

Fuel Tap Removal

- Drain the fuel from the fuel tank.
- Remove:
  Fuel Tap Knob Screw [A]
  Left Side Cover [B]
  Fuel Tap Knob [C]



- Remove the fuel hose [A].
- Remove the bolts [B] with nylon flat washers and take out the fuel tap [C].



Fuel Tap Installation

- Fuel tap installation is the reverse of removal. Note the following.
- Be sure the O-ring is in good condition to prevent leaks.
- Be sure to clamp the fuel hose to the tap to prevent leaks.
- Be sure the nylon washers in place of the fuel tap mounting bolts are in good condition to prevent leaks.
  - Do not use steel washers in place of the nylon washers, because they will not seal the bolts properly and fuel will leak.

Fuel Tank

Fuel Tank and Tap Cleaning

- Remove the fuel tank and drain it.
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.

⚠ WARNING

Clean the tank in a well-ventilated area, and take care that there is no spark or flames anywhere near the working area. Because of the danger or highly flammable liquids, do not use gasoline or low flash-point solvents to clan the tank.

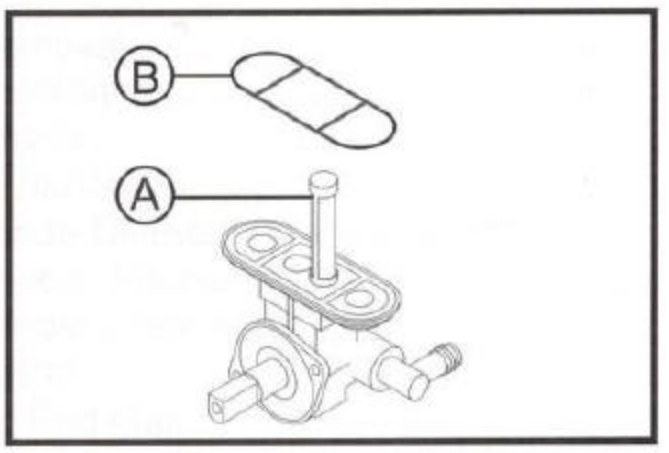
- Pour the solvent out of the tank.
- Remove the fuel tap from the tank by taking out the bolts with nylon washers.
- Clean the fuel tap filter screen in a high-flash point solvent.
- Dry the tank and tap with compressed air.
- Install the tap in the tank.
- Install the fuel tank.

Fuel Tap Inspection

- Remove the fuel tap (see Fuel Tap Removal).
- Check the fuel tap filter screen [A] for any breaks or deterioration.

★ If the fuel tap screen have any breaks or are deteriorated, it may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.

★ If the fuel tap leaks, replace the damaged O-ring [B] or fuel tap.



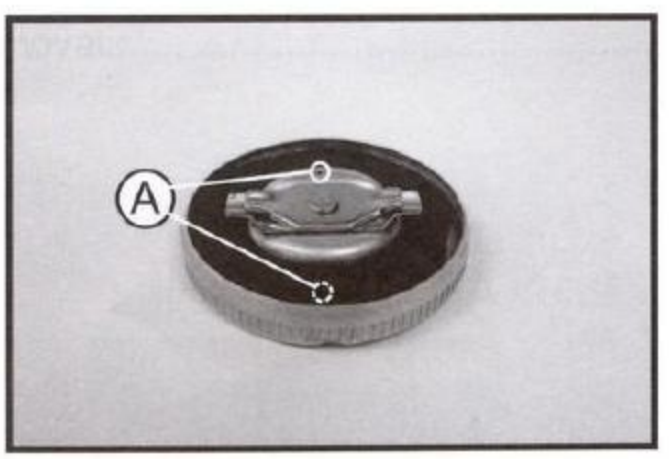
Fuel Tank Cap Inspection

- Remove the fuel tank cap.
- Visually inspect the gasket on the tank cap for any damage.

★ Replace the gasket if it is damaged.

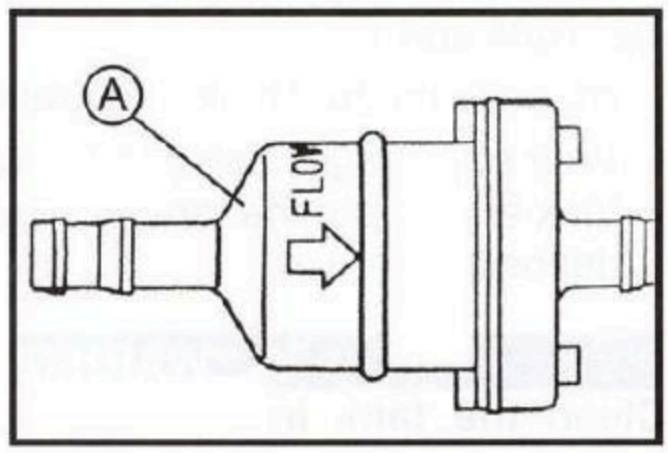
- Check to see if the breather [A] is not clogged up.

★ If they are clogged, then blow the breather free with compressed air.



Fuel Tank

Fuel Filter Inspection



- Turn the fuel tap to the OFF position.
- Remove the fuel filter [A].

★ If the filter is clear with no sing of dirt or other contamination, it is OK and no needs for replacement.

★ If the filter is dark or looks dirty, replace it. Also, check the rest of the fuel system for contamination.

Engine Top End

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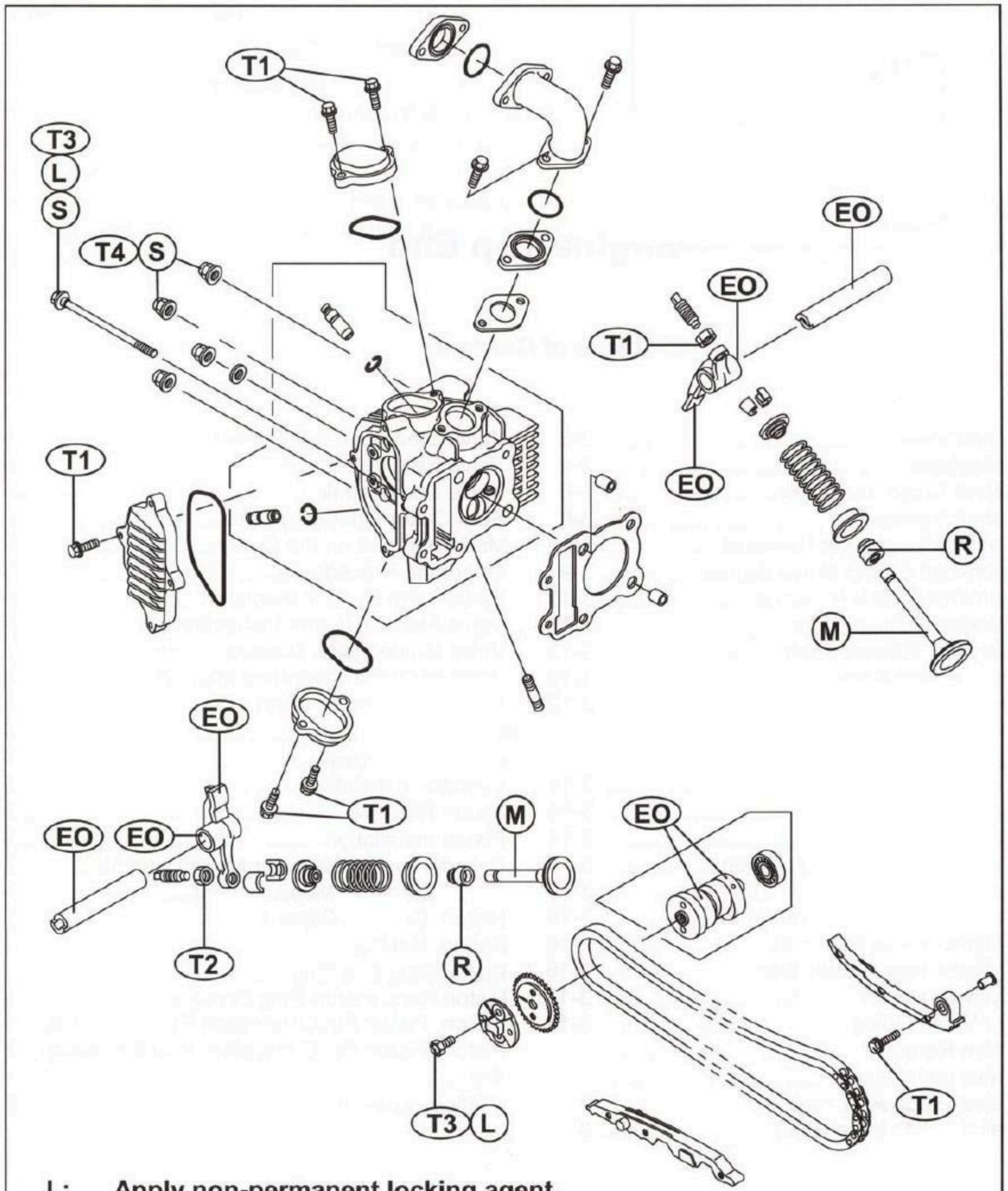
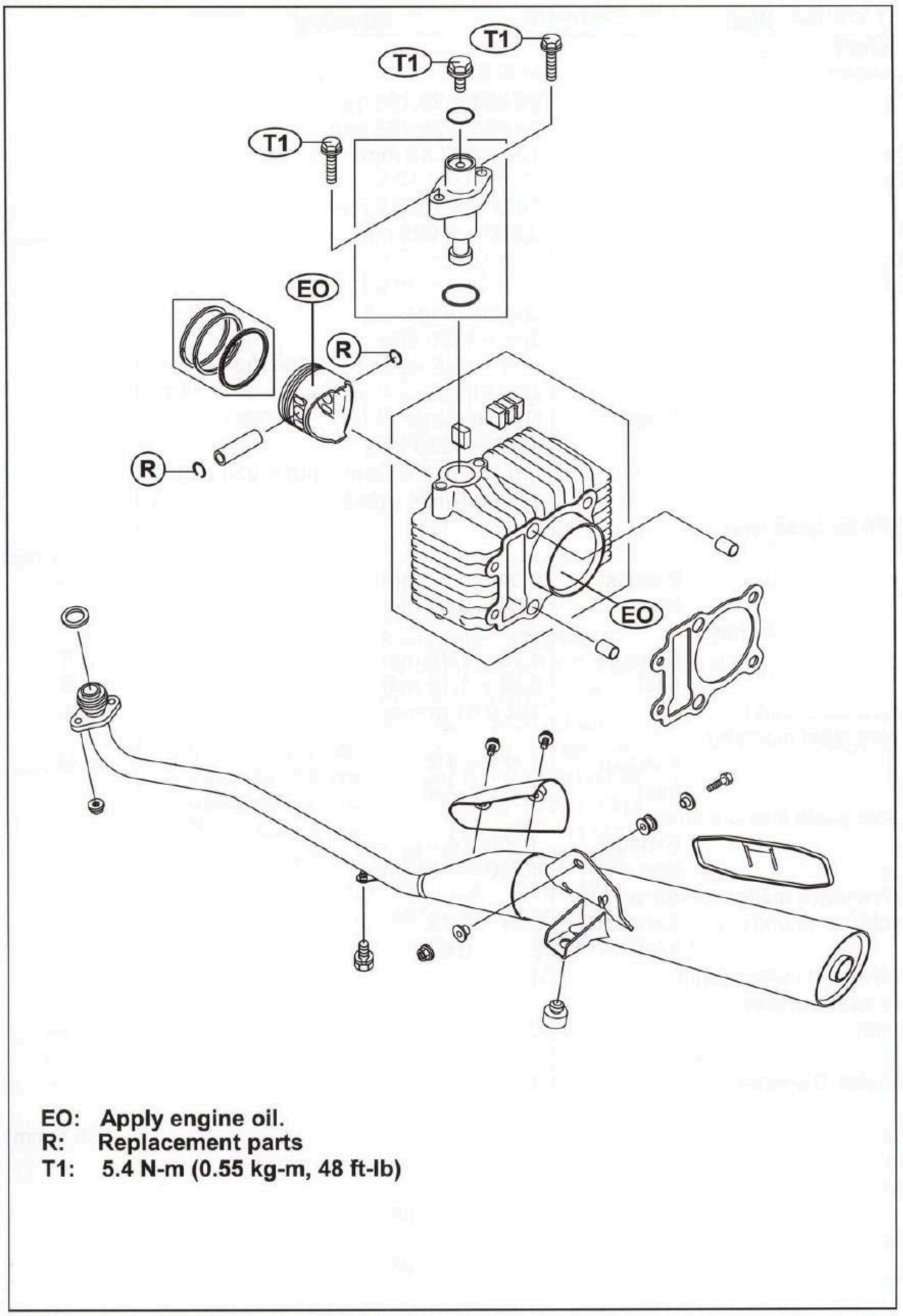
Exploded View



L: Apply non-permanent locking agent.
S: Follow the specific tightening sequence.
EO: Apply engine oil.
M: Apply molybdenum disulphide grease.
R: Replacement parts
T1: 5.4 N-m (0.55 kg-m, 48 ft-lb)
T2: 8.8 N-m (0.90 kg-m, 78 in-lb)
T3: 12 N-m (1.2 kg-m, 8.5 ft-lb)
T4: 22 N-m (2.2 kg-m, 16.0 ft-lb)

Exploded View



EO: Apply engine oil.
R: Replacement parts
T1: 5.4 N-m (0.55 kg-m, 48 ft-lb)

Specifications

Item		Standard	Service Limit
Camshaft:			
Camshaft:			
Cam height	Exhaust	29.054 ~ 29.168 mm	29.00 mm
	Inlet	28.996 ~ 29.152 mm	28.9 mm
Camshaft chain 20-link length		127 ~ 127.48 mm	128.9 mm
Rocker Arms, shaft			
Rocker arm inside diameter		10.000 ~ 10.015 mm	10.05 mm
Rocker arm shaft diameter		9.980 ~ 9.995 mm	9.95 mm
Cylinder Head:			
Cylinder Compression			
	Kick	Usable range 865 ~ 1320 kPa (8.8 ~ 13.5 kg/cm², 125 ~ 192 psi) @ 5 TIMES	---
	Electric	Usable range 1000 ~ 1520 kPa (10.2 ~ 15.5 kg/cm², 145 ~ 220 psi) @ 300 R/min (rpm)	---
Cylinder head warp			0.05 mm
Valve:			
Valve Clearance:	Exhaust	0.04 ~ 0.07 mm	---
	Inlet	0.04 ~ 0.07 mm	---
Valve head thickness:			
	Exhaust	1.15 ~ 1.45 mm	0.5 mm
	Inlet	0.85 ~ 1.15 mm	0.5 mm
Valve stem bend		TIR 0.01 mm or less	TIR 0.05 mm
Valve stem diameter:			
	Exhaust	4.455 ~ 4.470 mm	4.44 mm
	Inlet	4.475 ~ 4.490 mm	4.46 mm
Valve guide inside diameter:			
	Exhaust	4.500 ~ 4.512 mm	4.55 mm
	Inlet	4.500 ~ 4.512 mm	4.55 mm
Valve/valve guide clearance:			
(wobble method)	Exhaust	0.07 ~ 0.12 mm	0.17 mm
	Inlet	0.02 ~ 0.07 mm	0.12 mm
Valve seat cutting angle		45 , 32°, 60°, 67.5°	
Valve seat surface:			
Width:	Exhaust	0.80 ~ 1.15 mm	---
	Inlet	0.80 ~ 1.15 mm	---
Outside Diameter:	Exhaust	19.9 ~ 20.1 mm	---
	Inlet	22.9 ~ 23.1 mm	
Valve spring free length:		36.75 mm	35.5 mm
Cylinder, Piston:			
Cylinder inside diameter:		52.997 ~ 53.009 mm	53.10 mm
Piston diameter		52.970 ~ 52.982 mm	52.99 mm

3-5 ENGINE TOP END

Specifications

Item	Standard	Service Limit
Piston/cylinder clearance:	0.015 ~ 0.039 mm	---
Oversize piston and rings	+ 0.25 mm,+ 0.50 mm, 0.75 mm, and + 1.0 mm	---
		---
Piston ring/groove clearance:		
Top	0.02 ~ 0.06 mm	0.16 mm
Second	0.01 ~ 0.05 mm	0.15 mm
Piston ring groove width:		
Top	0.81 ~ 0.83 mm	0.90 mm
Second	0.80 ~ 0.82 mm	0.90 mm
Piston ring thickness:		
Top	0.77 ~ 0.79 mm	0.7 mm
Second	0.77 ~ 0.79 mm	0.7 mm
Piston ring end gap: Top	0.20 ~ 0.35 mm	0.6 mm
Second	0.30 ~ 0.50 mm	0.8 mm
Oil	0.10 ~ 0.60 mm	0.9 mm
Piston pin diameter	12.995 ~ 13.000 mm	12.96 mm
Piston pin hole diameter	13.001 ~ 13.007 mm	13.07 mm
Connecting rod small end inside diameter	13.003 ~ 13.014 mm	13.05 mm

Special Tools - Compression Gauge: 57001-221
Piston Pin Puller Assembly: 57001-910
Compression Gauge Adapter, M10 X 1.0: 57001-1317
Valve Guide Arbour, ⌀4.5: 57001-1331
Valve Guide Reamer, ⌀4.5: 57001-1333
Valve Seat Cutter Holder, ⌀4.5: 57001-1330
Valve Seat Cutter Holder Bar: 57001-1128
Valve Seat Cutter, 45° -⌀27.5: 57001-1114
Valve Seat Cutter, 32° -⌀25: 57001-1118
Valve Seat Cutter, 60° -⌀30: 57001-1123
Valve Seat Cutter, 32° -⌀22: 57001-1206
Valve Seat Cutter, 45° -⌀22: 57001-1205
Valve Seat Cutter, 67.5° -⌀22: 57001-1207

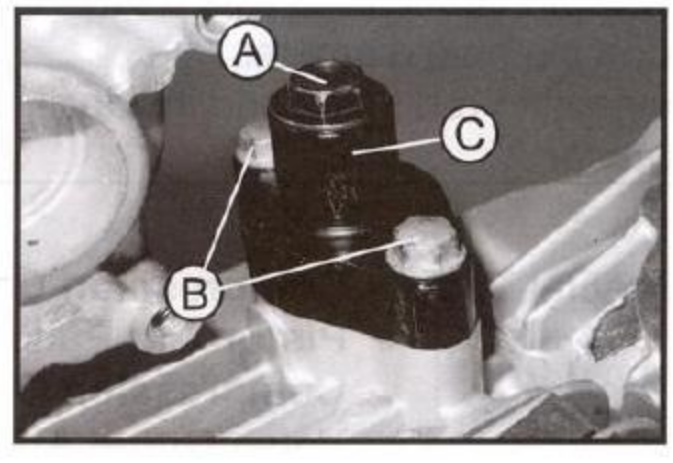
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

CAUTION

This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam chain slack. Observe all the rules listed below: When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Chain Tensioner Installation". Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.

- Remove
  Left Leg Shield (see Frame chapter)
- Loosen the cap bolt [A] before tensioner removal for later disassembly convenience.
- Unscrew the mounting bolts [B] and remove the camshaft chain tensioner [C].

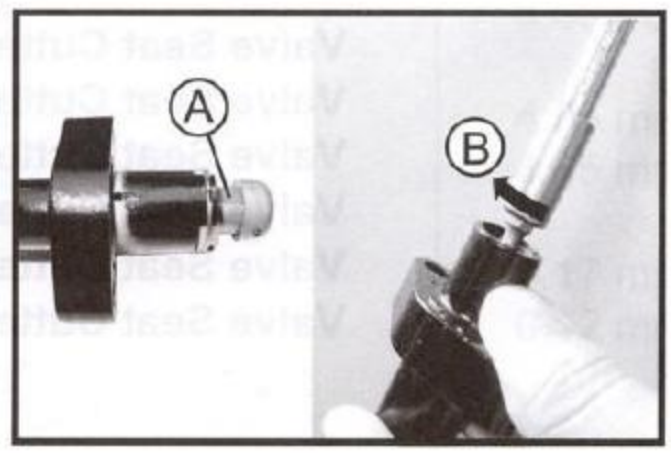


CAUTION

Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damaging the valves.

Camshaft Chain Tensioner Installation

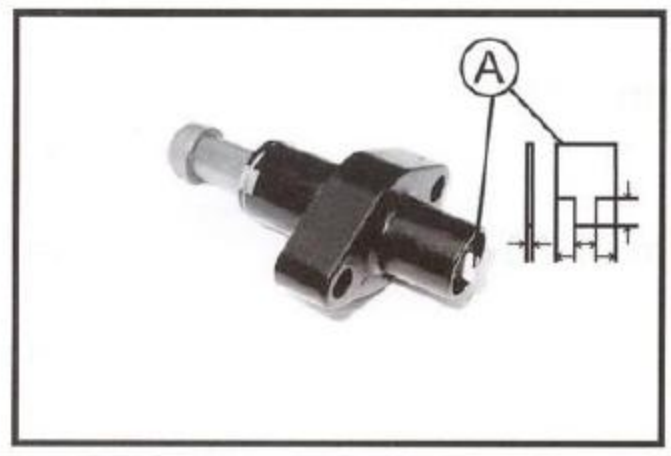
- Remove the tensioner cap bolt and O-ring.
- While compressing the push rod [A], turn it **clockwise** [B] with a suitable screwdriver until the rod protrusion comes to about **10 mm** from the tensioner body.



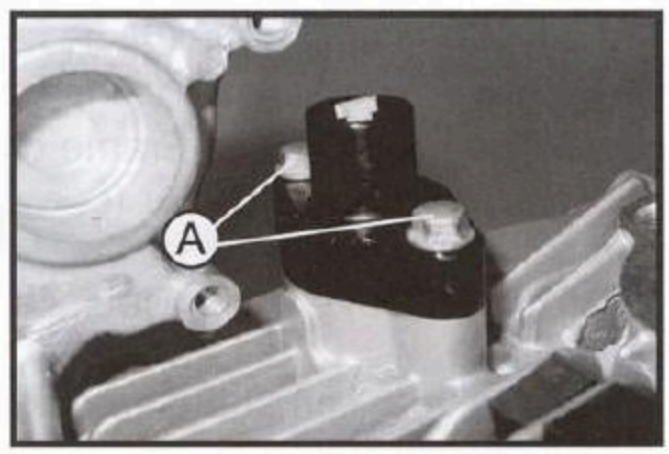
CAUTION

Do not turn the rod counter clockwise at installation. This could detach the rod and the tensioner cannot be reinstalled.

- While holding the rod in position with a suitable push rod holder plate [A] install the tensioner on the cylinder block.



Camshaft Chain Tensioner



- Apply non-permanent locking agent to the chain tensioner mounting bolts [A].
- Tighten the mounting bolt [A].

  Torque - Chain Tensioner Mounting Bolt: 5.4 N-m (0.55 kg-m, 48 in-lb)

- Take out the holder plate.
- Install the O-ring and tighten the cap bolt.

  Torque - Tensioner Cap Bolt: 5.4 N-m (0.55 kg-m, 48 in-lb)

- Install the left leg shield.

Replacement Chain Tensioner Installation

- A replacement chain tensioner (spare parts) has a push rod holder plate.
- Install the tensioner on the cylinder block, and tighten the mounting bolts.

  Torque - Chain Tensioner Mounting Bolts: 5.4 N-m (0.55 kg-m, 48 in-lb)

- Remove the plate [A] to release the push rod.
- Install the O-ring and tighten the cap bolt.

  Torque - Tensioner Cap Bolt: 5.4 N-m (0.55 kg-m, 48 in-lb)

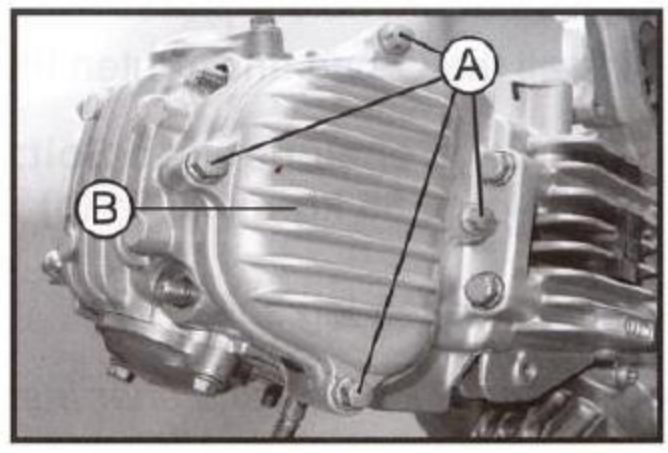
CAUTION
Do not pull the rod holder plate while the tensioner is removed. This could detach the rod and the tensioner cannot be installed easily.

Camshaft Sprocket

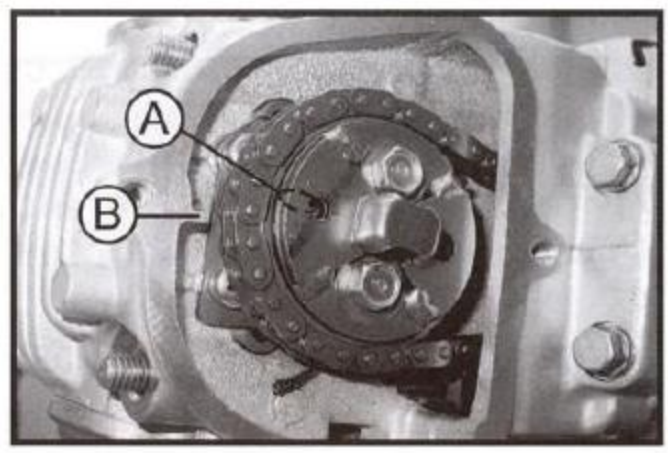
Camshaft Sprocket Removal

- Remove:
  Left Leg Shield (see Frame chapter)
  Engine Sprocket Cover (see Final Drive chapter)
  Magneto Cover (see Electrical System chapter)

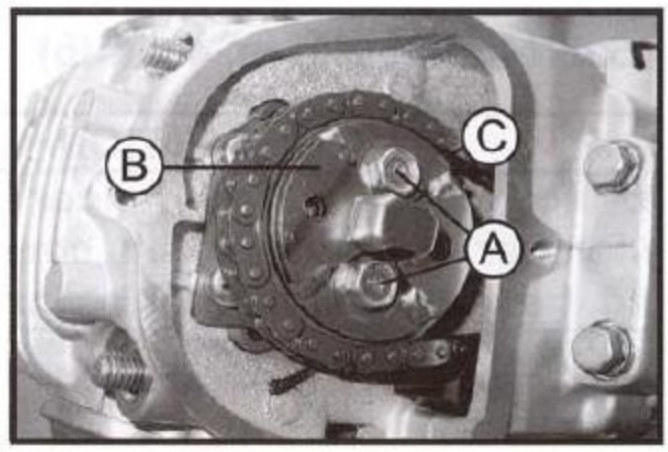
- Remove the camshaft sprocket cover bolts [A] and take off the cover [B].



- Turn the crankshaft counter clockwise until the line adjoining the line mark on the camshaft sprocket aligns of the sprocket cover mating surface projection [B].
- Remove the camshaft chain tensioner.



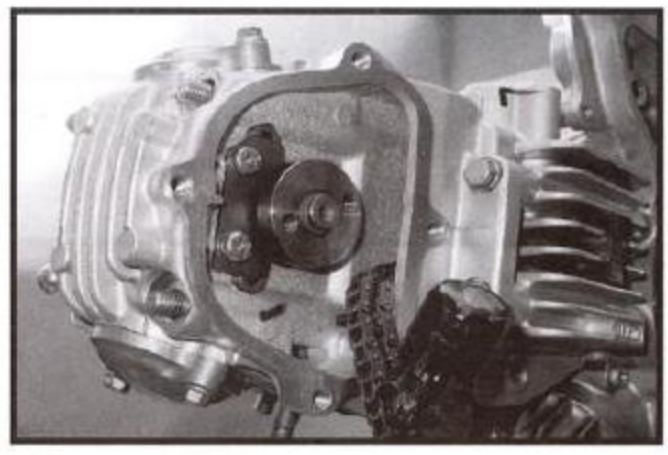
- With a wrench on the magneto flywheel bolt to keep the crankshaft from turning remove the camshaft sprocket bolts [A].
- Remove camshaft sprocket plate [B] and camshaft sprocket [C].



- Using a screwdriver [A] or wire to keep the chain [B] from falling down into the cylinder clock.

CAUTION

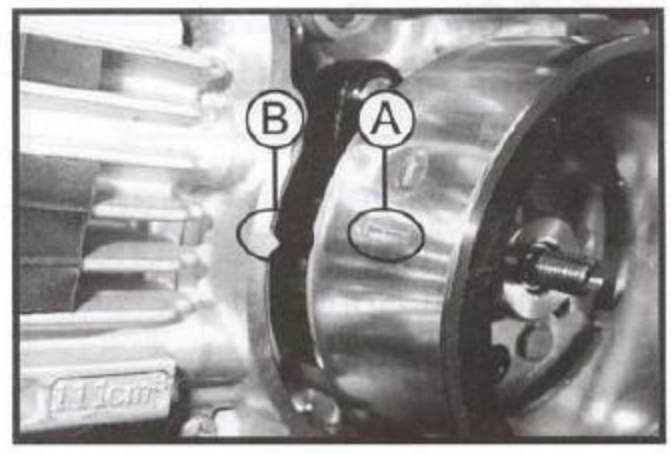
Always pull the camshaft chain taut while turning the crankshaft when the camshaft chain is loose. This avoids kinking the chain on the lower (crankshaft) sprocket. A kicked chain could damage both the chain and the sprocket.



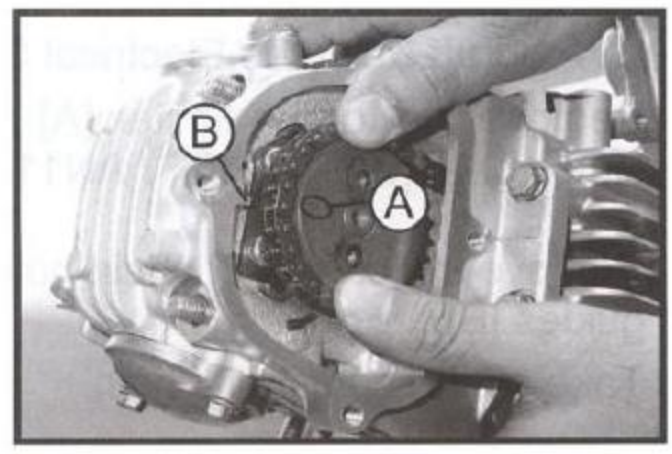
Camshaft Sprocket

Camshaft Sprocket Installation

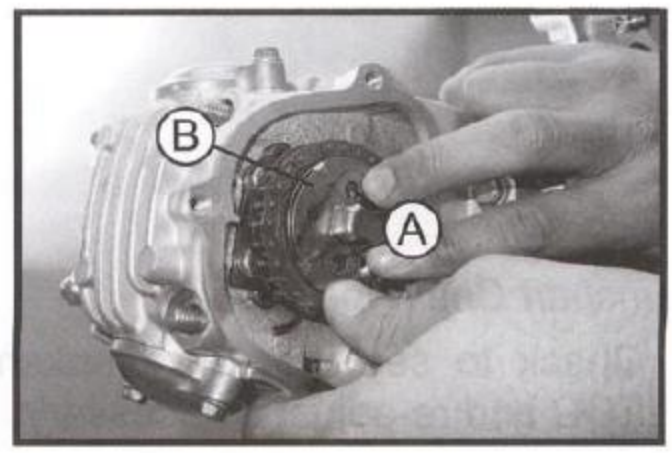
- Check crankshaft position to see that the "T" mark [A] on the magneto flywheel aligns with the index mark [B] on the crankcase.
- Remember to pull the camshaft chain taut before rotating the crankshaft.



- Pull the lower side of the chain taut and fit it onto the sprocket so that the line [A] on the sprocket aligns with the mark on the sprocket cover mating surface projection [B].



- Fit the sprocket up into place.
  Turn the camshaft so that the cam lobes point downward, while holding the sprocket steady to align the bolt holes [A].
- Install the sprocket plate [B] on the same way.
- Apply a non-permanent locking agent to the camshaft sprocket bolts.
- Keep the crankshaft from turning by holding a wrench on the magneto flywheel bolt.
- Tighten the sprocket bolts.



Torque - Camshaft Sprocket Bolts:
12 N-m (1.2 kg-m, 8.5 ft-lb)

- Install the camshaft chain tensioner.
- Check the camshaft chain timing.
  Turn the crankshaft two turns in the counter clockwise, the crankshaft is at TDC, and re-check the camshaft chain timing.

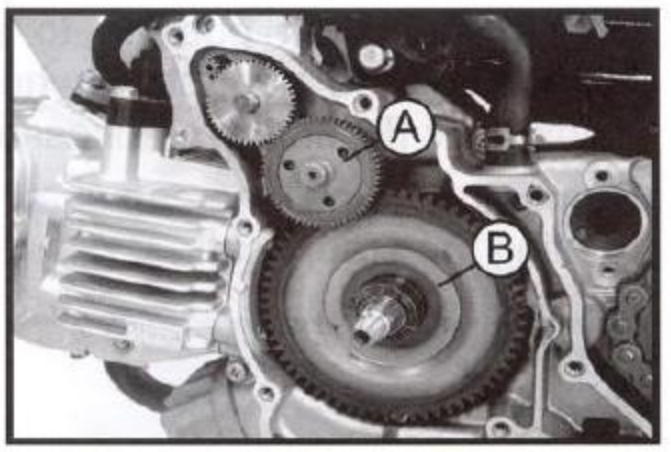
★ If the timing mark is aligned, the camshaft chain timing is correct.

CAUTION
Rotation of the crankshaft with improper camshaft timing could cause the valve to contact each other or the piston, and bend. **If any resistance is felt when turning the crankshaft, stop immediately, and check the camshaft chain timing.**

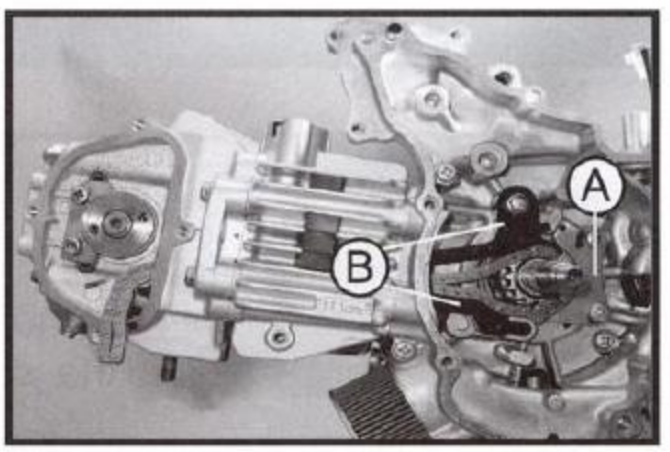
Camshaft Sprocket

Camshaft Chain Removal

- Drain the engine oil
- Remove
  Left Leg Shield (see Frame chapter)
  Camshaft Chain Tensioner
  Camshaft Sprocket
  Cylinder Head
  Magneto Cover (see Electrical System chapter)
  Magneto Flywheel (see Electrical System chapter)
  Woodruff Key (see Electrical System chapter)
- Remove the torque limiter [A] and starter motor clutch gear [B] (AN110F / AN110H Model).

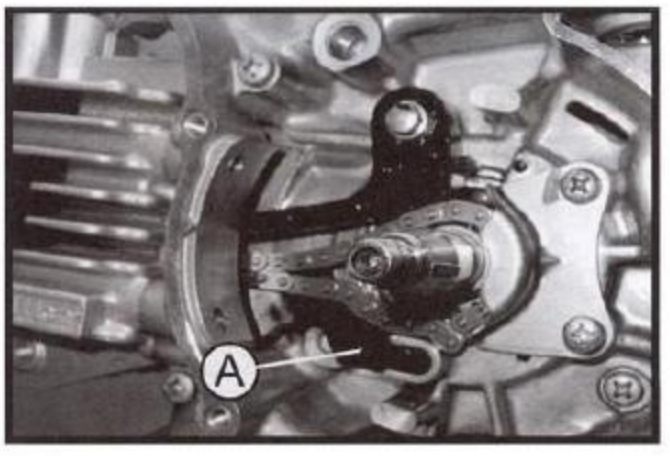


- Remove the camshaft chain holder [A] and chain guides [B].
- Take off the camshaft chain.



Camshaft Chain Installation

- Check to see that the crankshaft position is it TDC and re-adjust if necessary.
- Install the camshaft chain to the crankshaft and it is pulled up to the camshaft sprocket passes through camshaft chain hole in the cylinder.
- Keep the chain.
- Install the upper chain guide and camshaft chain holder.



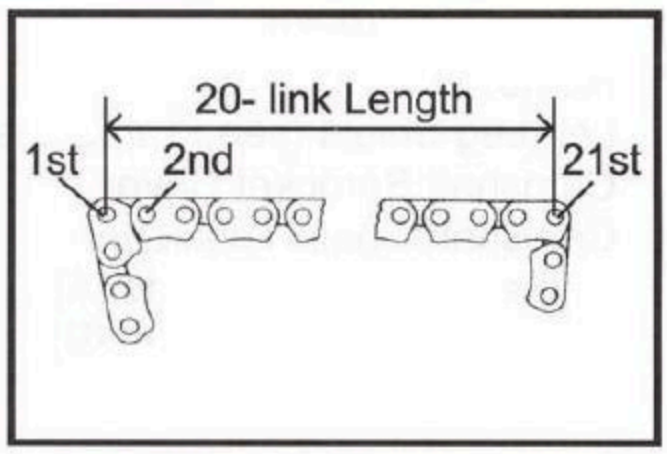
Torque - Camshaft Chain Guide Bolt:
5.4 N-m (0.55 kg-m, 48 in-lb)
Camshaft Chain Holder Bolts:
5.4 N-m (0.55 kg-m, 48 in-lb)

- Insert the lower chain guide [A] securely as shown.
- Install the other removed parts.

Camshaft Sprocket

Camshaft Chain Wear

o Hold the chain taut with a force of about 49N (5kg, 11lb) in some manner and measure a 20 link length. Since the chain may wear unevenly, take measurement at several places.



Camshaft Chain 20 Link Length
Standard: 127 ~ 127.48 mm
Service Limit: 128.9 mm

★ If the measurement of the camshaft chain exceeds the service limit, replace the chain.

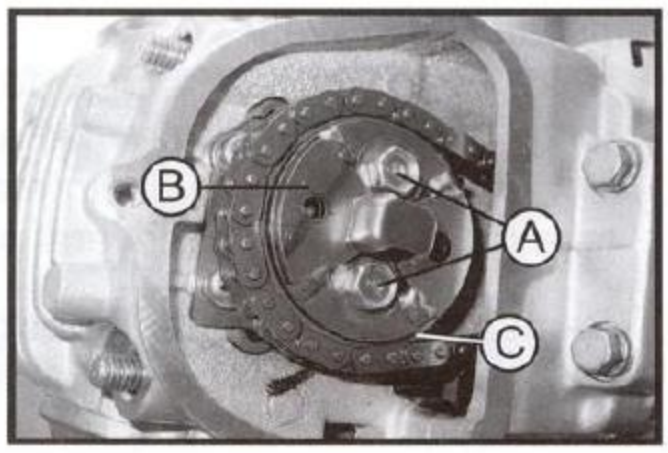
Camshaft Chain Guide Wear

• Visually inspect the rubber on the guides.
★ If the rubber is damaged or is missing places, replace the guide.

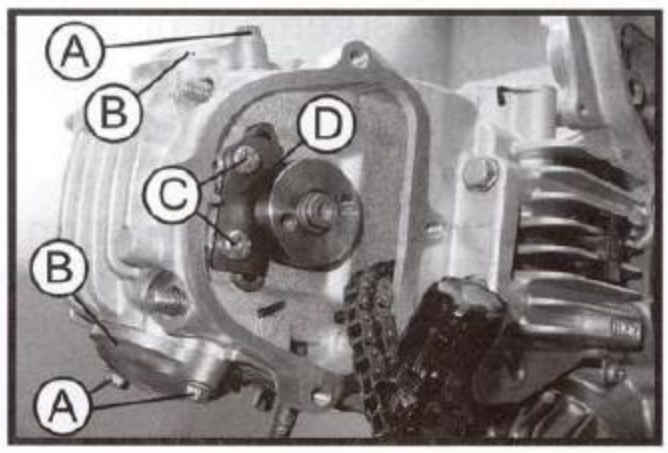
Rocker Arm, Rocker Arm Shaft

Rocker Arm Removal

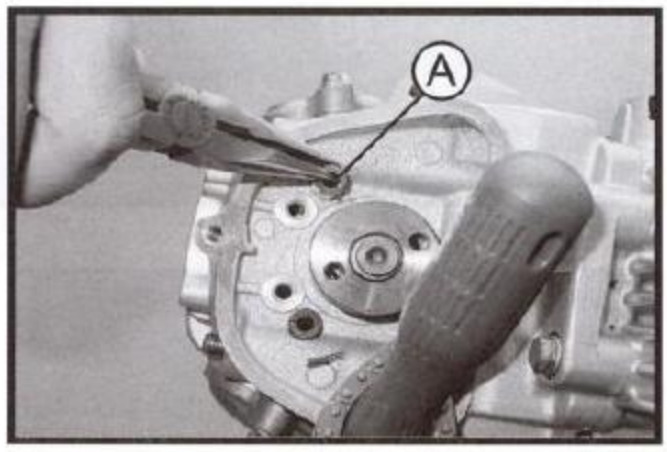
- Remove
  Left Leg Shield (see Frame chapter)
  Camshaft Sprocket Cover
  Camshaft Chain Tensioner
  Camshaft Sprocket Bolts [A]
  Camshaft Sprocket Plate [B]
  Camshaft Sprocket [C]



Valve Adjusting Cover Bolts [A]
Valve Adjusting Covers [B]
Rocker Arm Shaft Stopper Screws [C]
Rocker Arm Shaft Stopper [D]

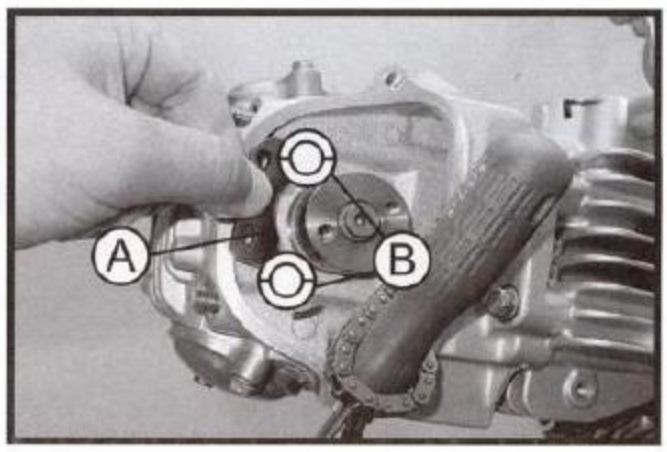


- While holding the rocker arm with hand, pull out the rocker arm shaft [A] and take off the rocker arms.
- Mark and record the rocker arm locations so that the rocker arm can be reinstalled in their original positions.



Rocker Arm Installation

- Clean the rocker arms and rocker arm shafts with a high flash-point solvent.
- Apply clean engine oil to the rocker arm shaft outside and rocker arm cam parts.
- Turn the camshaft so that the cam lobes point downward.
- Install the each rocker arm shaft, running it through each rocker arm.
- Install the rocker arm shaft stopper [A] so that the each rocker arm shaft protrusion [B] face to face.
- Tighten the rocker arm shaft stopper screws.



Torque - Rocker Arm Shaft Stopper Screws:
5.4 N-m (0.55 kg-m, 48 in-lb)

Rocker Arm, Rocker Arm Shaft

- Install the camshaft sprocket.

o Check and adjust the valve clearance.

CAUTION

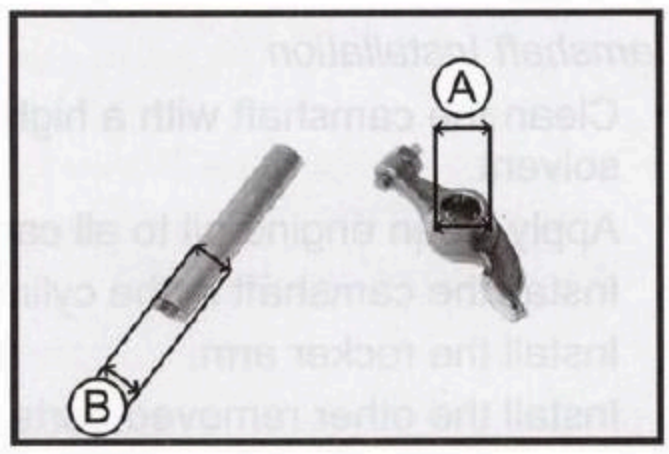
When install the valve adjusting covers, be careful not to drop of protrude the O-rings from the cover grooves. If the O-ring is installed improperly, oil will leak.

Rocker Arm & Arm Shaft Wear

- Visually inspect where the cam and valve stem wear on each arm.

★ If there is any damage or uneven wear, replace the arm.

o Measure the inside diameter [A] of each rocker arm with a cylinder gauge.



Rocker Arm Inside Diameter
Standard: 10.000 ~ 10.015 mm
Service Limit: 10.05 mm

★ If it exceeds the service limit, replace the arm.

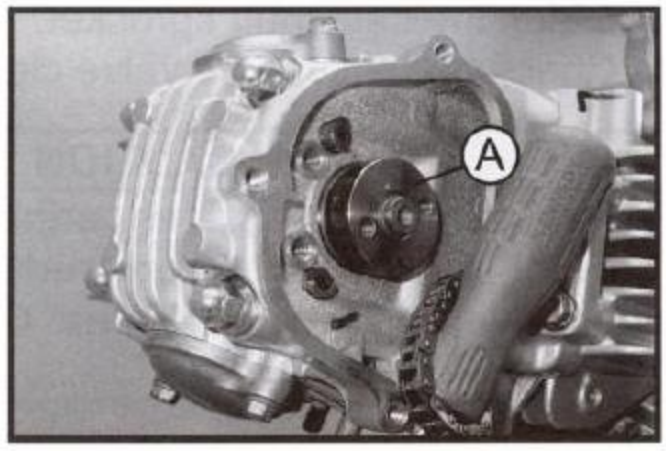
o Measure the diameter [B] of each rocker arm shaft where the rocker arm fits.

Rocker Arm Shaft Diameter
Standard: 9.980 ~ 9.995 mm
Service Limit: 9.95 mm

★ If the diameter is less than the service limit, replace the rocker arm shaft.

Camshaft

Camshaft Removal



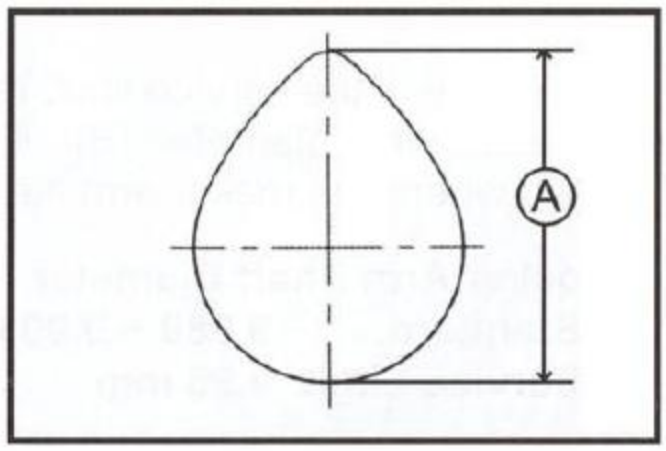
- Remove:
  Left Leg Shield (see Frame chapter)
  Camshaft Chain Tensioner
  Camshaft Sprocket
  Rocker Arms
- Pull out the camshaft [A].

Camshaft Installation

- Clean the camshaft with a high flash-point solvent.
- Apply clean engine oil to all cam parts.
- Install the camshaft in the cylinder head.
- Install the rocker arm.
- Install the other removed parts.

o Check and adjust the valve clearance.

Camshaft Inspection



- Visually inspect the cam for wear or damage.

★ If there is any damage or wear, replace the camshaft.

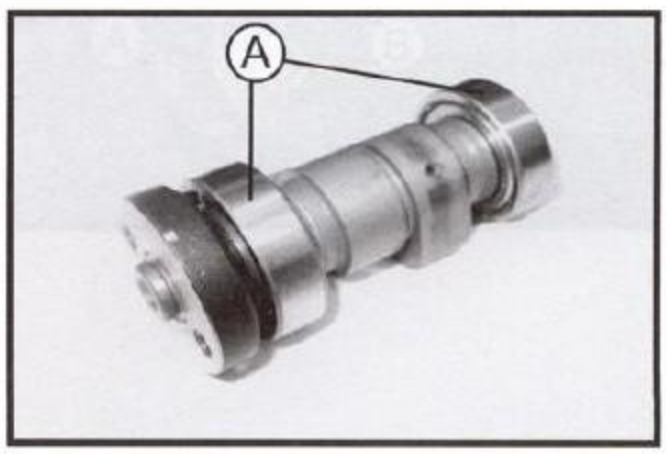
- Measure the height [A] of each cam.

Cam Height:

	Exhaust	Inlet
Standard:	**29.054~29.168mm**	**28.996~29.152mm**
Service Limit:	**29.0 mm**	**28.9 mm**

★ If any cam is worn down past service limit, replace the camshaft.

Camshaft Bearing Inspection



- Visually inspect each camshaft bearing [A].

★ If there is any damage replace the camshaft.

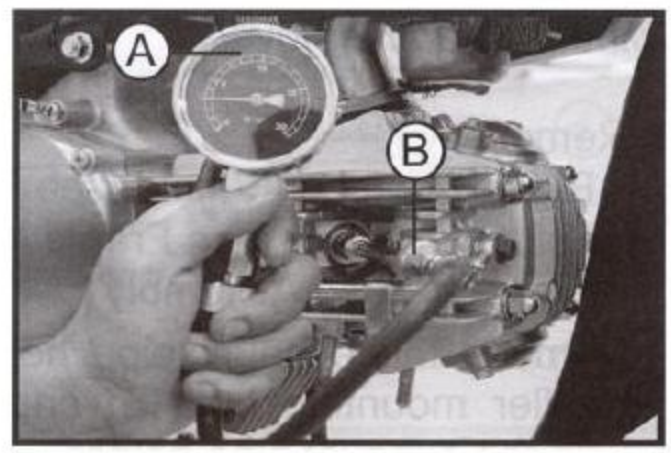
- Turn the bearing back and forth while checking for roughness or binding.

★ If roughness or binding is found, replace the camshaft.

★ If it is noisy, does not spin smoothly, or has any rough spots, replace the camshaft.

Cylinder Head

Compression Measurement



- Remove the right leg shield.
- Warm up the engine thoroughly.
- Stop the engine.
- Remove the spark plug and attach compression gauge and adapter firmly into the spark plug hole.

  Special Tool - Compression Gauge:
  57001-221 [A]
  Compression Gauge Adapter, M10 X 1.0:
  57001-1317 [B]

- With the throttle fully open, turn the engine over sharply with the kick starter several times until the compression gauge stops rising; the compression is the highest reading obtainable.

  Cylinder Compression
  Usable Range:
  865~1320 kP
  (8.8~13.5 kg/cm^2 , 125~192 psi) @ 5 kicks

- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable (AN110-F1).

  Cylinder Compression
  Usable Range:
  1000~1520 kPa
  (10.2~15.5 kg/cm^2 ,145~220 psi) @ 300rpm

The following table should be consulted if the obtainable compression reading is not within the usable range.

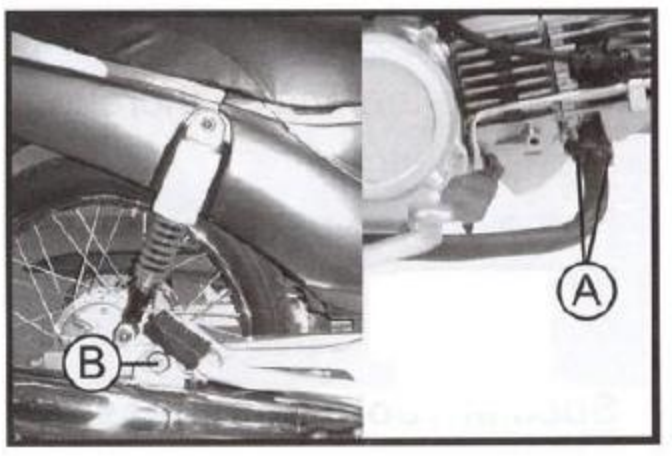
Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and /or damaged position oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket, cylinder base gasket thickness.	Replace to gasket with a standard part.
Cylinder compression is lower than usable range	Gas leakage around cylinder head.	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating.	Repair if necessary.
	Incorrect valve clearance .	Adjust the valve clearance.
	Incorrect Piston/cylinder clearance.	Replace the piston and/or cylinder
	Piston seizure.	Inspect the cylinder (and liner) and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves.	Replace the piston and/or the piston Rings.

- Remove the compression gauge, adapter and install the spark plug.
  Torque - Spark Plug: 13.0 N-m (1.3 kg-m, 9.5 ft-lb)

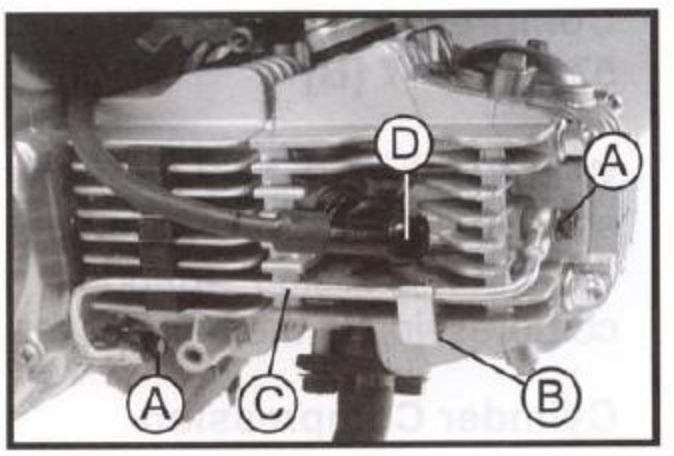
Cylinder Head

Cylinder Head Removal

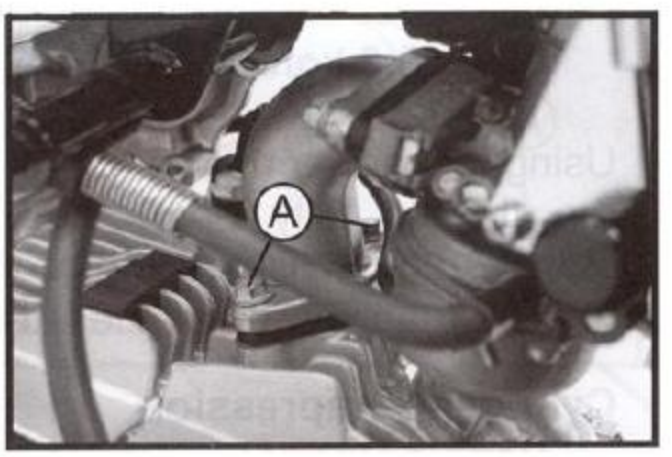
- Remove:
  Right & Left Leg Shield (see Frame chapter)
  Left Side Cover (see Frame chapter)
  Front Footpeg Assembly
- Remove the exhaust pipe holder nuts [A], and muffler mounting bolt [B] and then the muffler with the exhaust pipe holder.



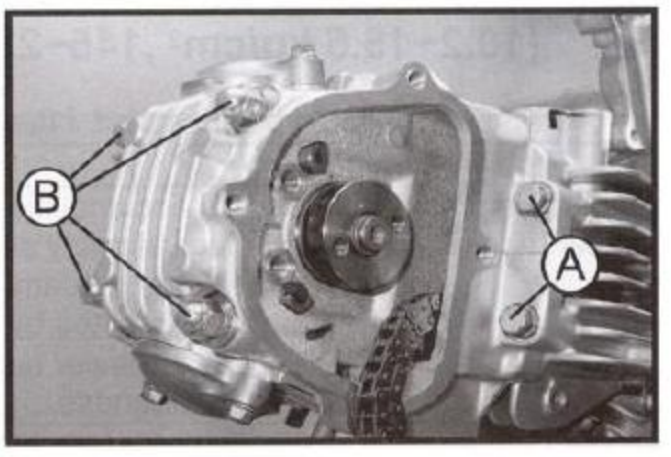
- Remove the oil pipe Banjo bolts [A], screws [B] and take of the oil pipe [C].
- Remove the plug cap [D].



- Unscrew the intake pipe bolts [A].
- Remove:
  Camshaft Sprocket Cover
  Camshaft Chain Tensioner
  Camshaft Sprocket

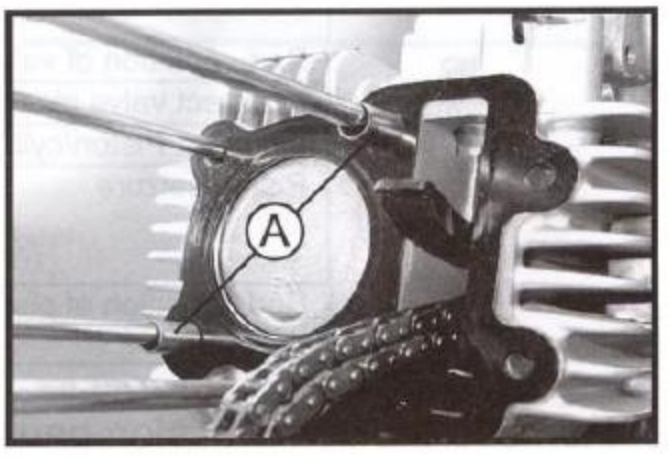


- Remove the cylinder head bolts [A], nuts [B] and take off the cylinder head.

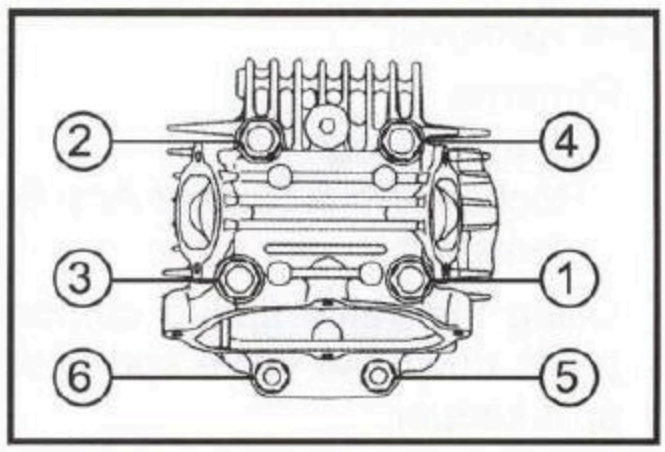


Cylinder Head Installation

- Check to see that the two dowel pins [A] are in place on the cylinder.
- Install a new cylinder head gasket [B].

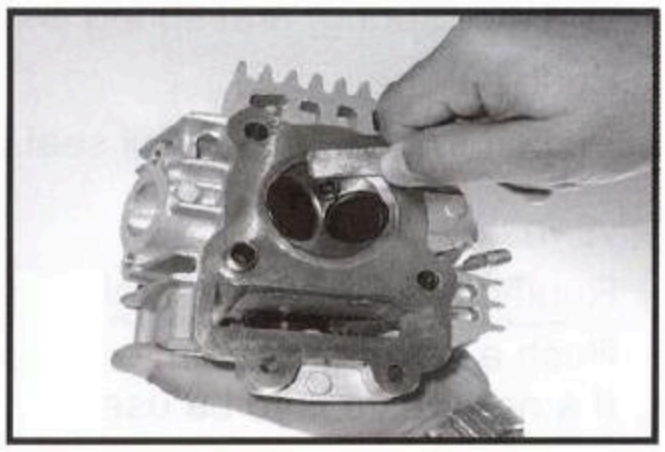


Cylinder Head



- Fit the cylinder head onto the cylinder block using a screwdriver or wire to keep the chain from falling down into the cylinder block.
- Apply a non-permanent locking agent to the cylinder head bolts.
- Tighten the cylinder head nuts and bolts following the tightening sequence as shown.

First Torque - Cylinder Head Bolts:
5.9 N-m (0.6 kg-m, 52 in-lb)
Cylinder Head Nuts:
13.0 N-m (1.3 kg-m, 9.5 ft-lb)
Final Torque - Cylinder Head Bolts:
12 N-m (1.2 kg-m, 8.5 in-lb)
Cylinder Head Nuts:
22 N-m (2.2 kg-m, 16 ft-lb)



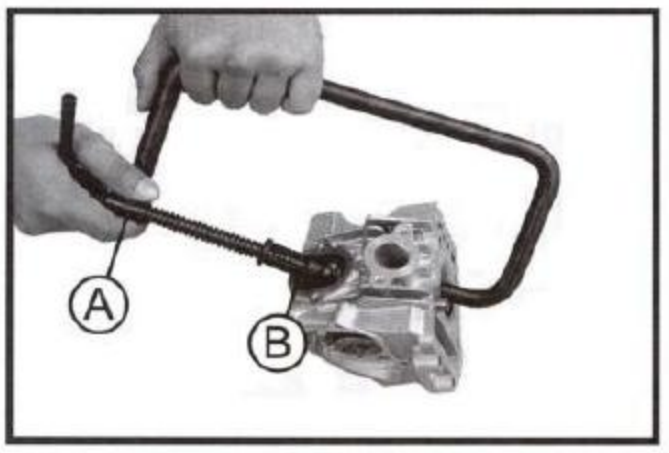
- Install the camshaft sprocket.
- Install the other removed parts.

Cylinder Head Cleaning

- Scrape out any carbon, and wash the head with a high flash-point solvent.

Valve/Valve Guide

Valve Removal

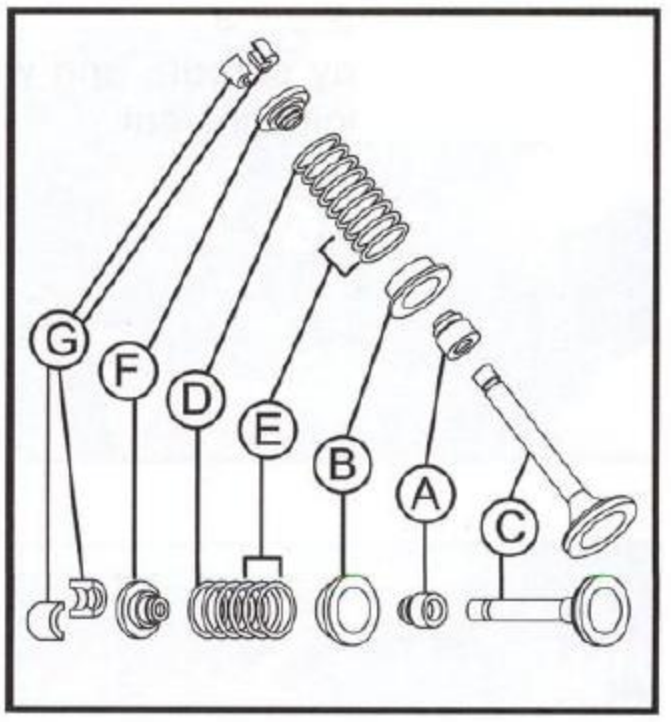


- Remove:
  Cylinder Head
  Rocker Arm & Rocker Arm Shaft
  Camshaft
- Using the valve spring compressor assembly to press down the valve spring retainer, remove the split keeper.

Special Tools - Valve Spring Compressor Assembly:
57001-241 [A]
Valve Spring Compressor Adapter, ϕ20:
57001-1154 [B]

- Remove the tool and then remove the spring retainer, spring, and spring seat.
- Push out the valve.
- Pull off the valve stem oil seal.

Valve Installation



- Replace the valve stem oil seal [A].
- Push a new valve stem oil seal into place.
- ★ If a new valve is to be used, check the valve to guide clearance.
- ★ If there is too much clearance, install a new valve guide.
- Check the valve seat [B].
- Apply a thin coat of molybdenum disulphide grease to the valve stem [C].
- Install spring [D] so that the closed coil end [E] faces downward, white paint faces upward.
- Install the spring retainer [F] press it down with the valve spring compressor assembly, and put on the split keeper [G].
- After making sure that the split keepers and valve stems are all properly fitted, remove the tool.
- Install:
  Camshaft
  Rocker Arm & Arm Shaft
  Cylinder Head
- o Check the valve clearance, and adjust if necessary.

General Information

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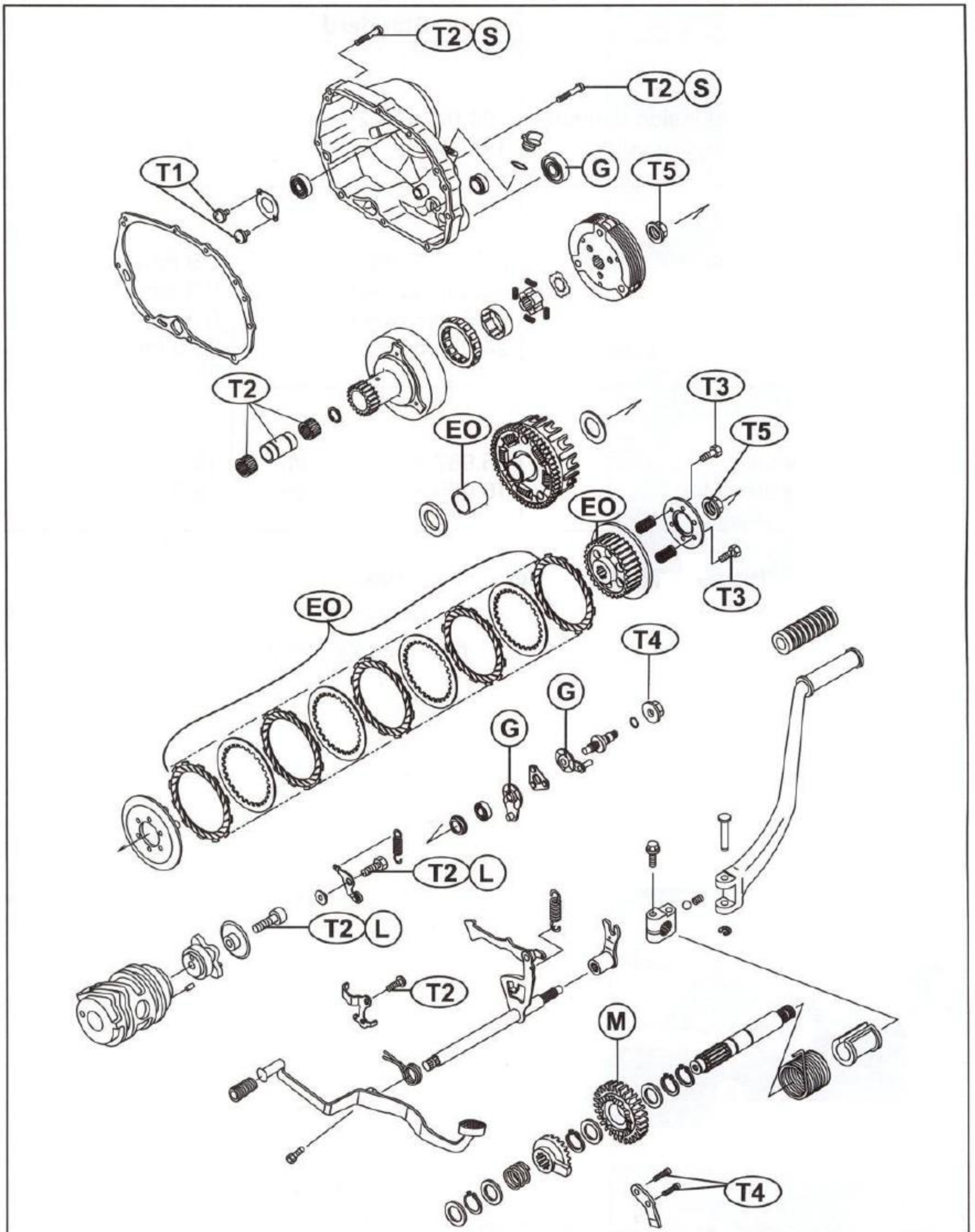
Exploded View



G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
EO: Apply engine oil.
S: Follow the specific tightening sequence.

T1: 2.9 N-m (0.3 kg-m, 26 in-lb)
T2: 5.4 N-m (0.55 kg-m, 48 in-lb)
T3: 3.4 N-m (0.35 kg-m, 30 in-lb)
T4: 19 N-m (1.9 kg-m, 13.5 ft-lb)
T5: 22 N-m (2.2 kg-m, 16 ft-lb)
T6: 72 N-m (7.3 kg-m, 53 ft-llb)

Specifications

Item	Standard	Service Limit
Primary Clutch :		
Primary clutch housing inside diameter	104.0 ~ 104.2 mm	104.5 mm
Primary clutch shoe groove depth	1.0 mm	0.5 mm
Secondary Clutch:		
Friction plate thickness	3.1 ~ 3.3 mm	2.9 mm
Friction plate warp	0.2 mm or less	0.3 mm
Steel plate warp	0.15 mm or less	0.3 mm
Clutch spring free length	24.0 mm	23.0 mm
Kick Shaft:		
Kick shaft diameter	15.957 ~ 15.984 mm	15.93 mm
Kick gear inside diameter	16.000 ~ 16.018 mm	16.04 mm

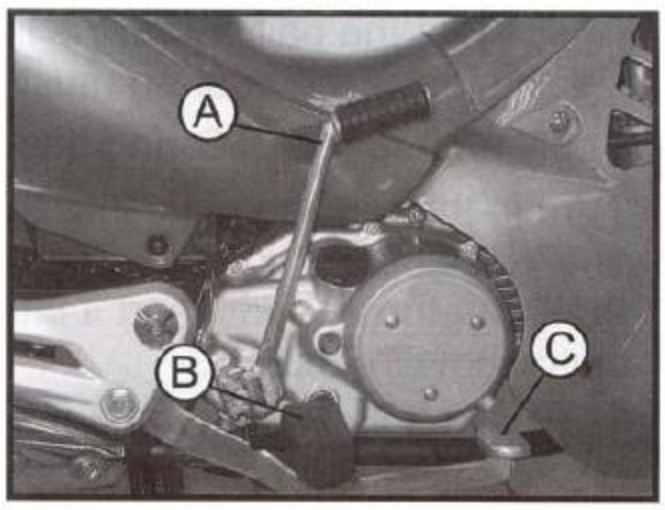
Special Tool - Primary Clutch Holder: N9501-1003
Clutch Holder: N9501-1002

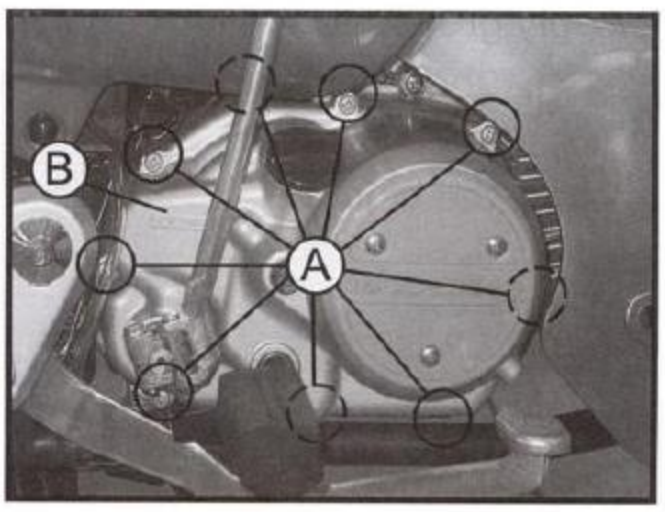
Clutch Cover

Clutch Cover and Oil Screen Removal

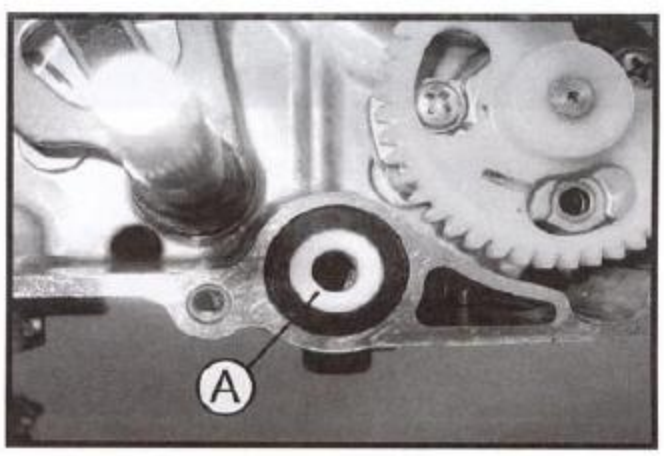
- Drain the engine oil (see Engine Lubrication System).
- Remove:
  Right Leg shield
  Right Side Cover
  Kick Pedal [A]
  Front Footpeg [B]
  Muffler Assembly
  Brake Pedal (hanging) [C]

  Clutch Cover Screws [A]
- Pull out the clutch cover [B].



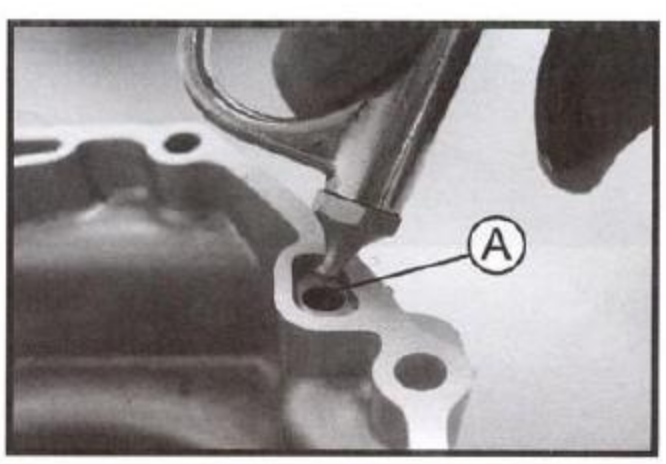


- Unscrew the clutch adjuster locknut.
- The release plate and the release shaft come out with the cover.
- Pull out the oil screen [A].



Clutch Cover and Oil Screen [A].

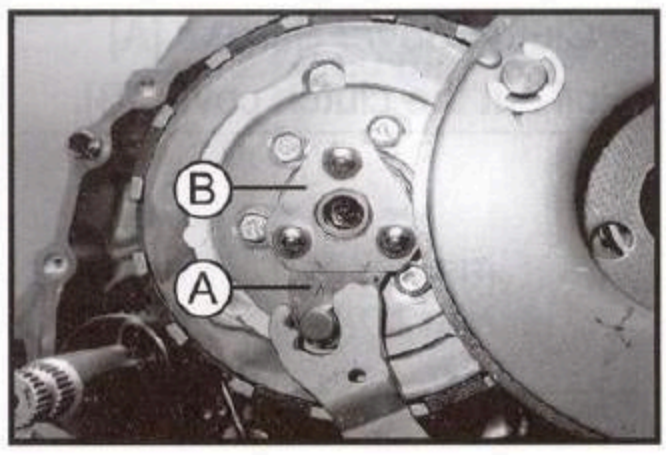
- Clean any metal particles and other dirt out of the oil screen.
- Using compressed air, blow out any particles that may obstruct the oil passage [A] in the clutch cover.



Clutch Cover

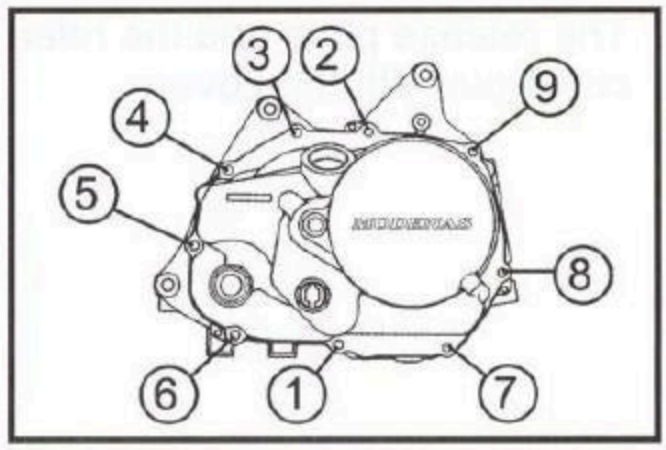
- Check that the ball bearing is in place. The shield side of the bearing must be faced inside.
- Apply grease to the O-ring and install it.
- Turn in the release plate into the release shaft fully but no tightly and then back it out the three turns, and insert it into the hole of clutch cover securely.
- Tighten the locknut into the release shaft from the opposite side.

- Apply grease to the kick shaft oil seal lips.
- Check that the two dowel pins are in place on the crankcase.
- Install the clutch cover. Be sure that the release cam [A], and release ball assembly [B] are not falling down.



Tighten the clutch cover screws following the tightening sequence.

Torque - Clutch Cover Screw: 5.4 N-m (0.55 kg-m, 48 in-lb)

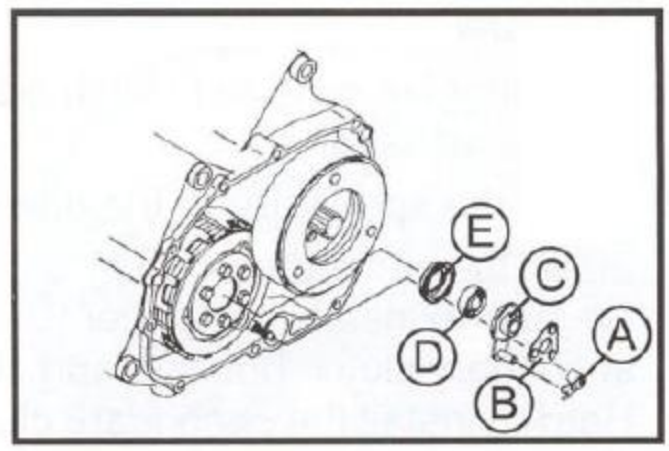


- Adjust the clutch.

Clutches

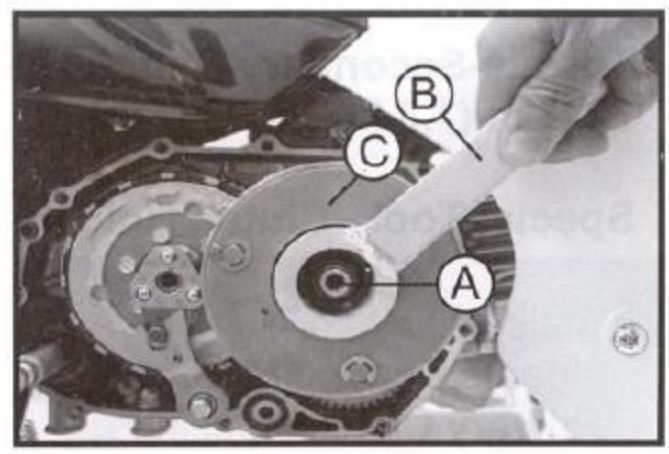
Clutch Removal

- Remove the clutch cover (see this chapter).
- Pull out the clutch release lever [A].
- Remove:
  Release Ball Assembly [B]
  Release Cam [C]
  Ball Bearing [D]
  Ball Bearing Holder [E]



- Remove the primary clutch hub nut [A], while holding the primary clutch steady with the primary clutch holder [B].

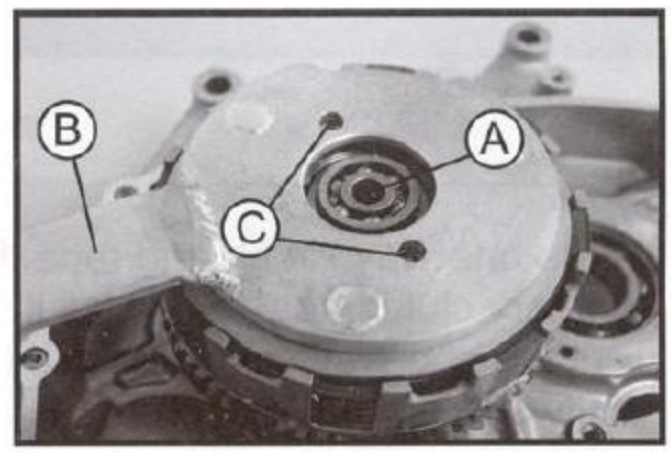
  Special Tool - Primary Clutch Holder: N9501-1003



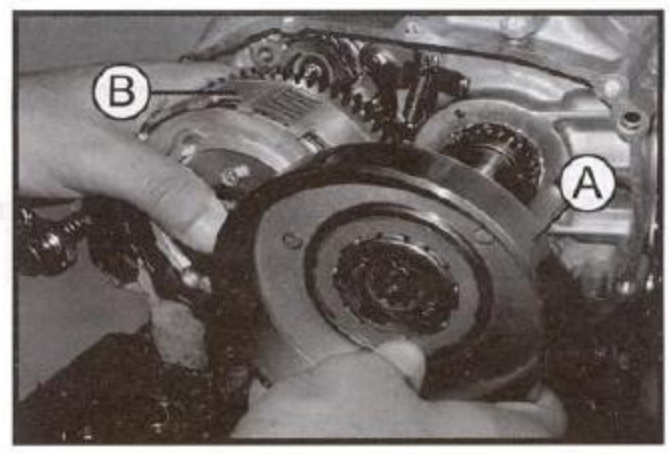
- Pull out the primary clutch hub [C]

- Remove the secondary clutch hub nut [A], while holding the secondary clutch steady with the clutch holder [B].
  - Search the positions of three notches of clutch holder, which can be aligned.
  - Remove two clutch spring bolts [C] inserted into the two holes of clutch holder when searching.
  - Set a clutch holder.

  Special Tool - Clutch Holder: N9501-1002

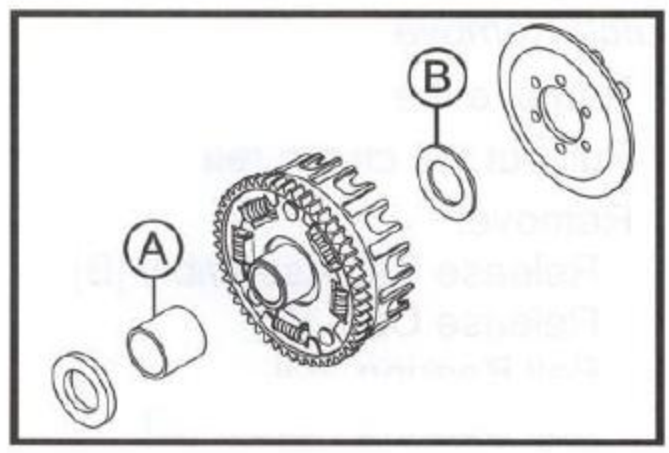


- Remove the primary clutch [A] and secondary clutch [B] together.
  - Do not remove the one-way clutch from the primary clutch.
- Remove the spacer from the drive shaft .



Clutches

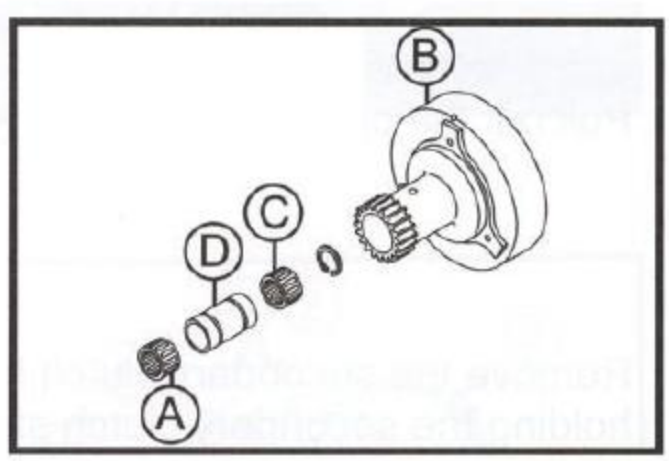
Clutch Installation



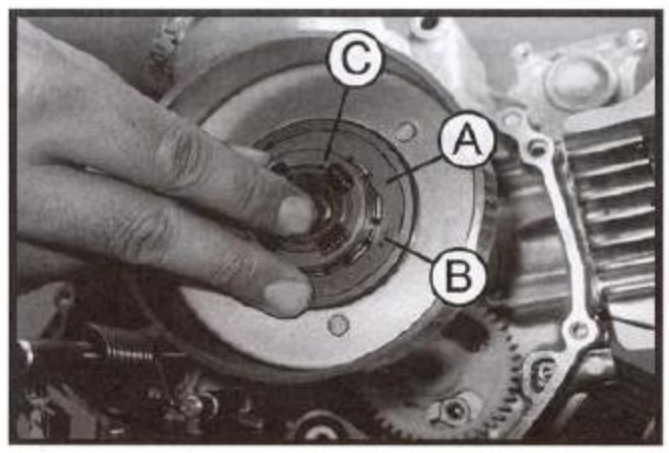
- Apply engine oil to the clutch sleeves and drive shaft, crankshaft.
- Install the spacer [A] to the drive shaft.
- Insert the secondary clutch.
  - o Be sure to install the spacer [B] between secondary clutch housing and clutch wheel.
  - o Hard to install the secondary clutch, turn the drive shaft while pushing the clutch.
- Tighten the secondary clutch nut, while holding the secondary clutch holder.

Torque-Secondary Clutch Hub Nut:
72 N-m (7.3 kg-m, 53 ft-lb)

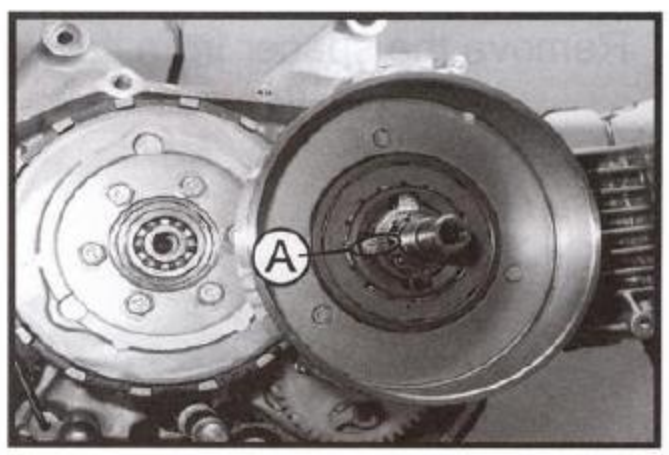
Special Tool - Clutch Holder: N9501-1002



- Install:
  Needle Bearing [A]
  Primary Clutch Housing [B]
  Needle Bearing [C]
  Primary Clutch Sleeve [D]



- ✶ If the one-way clutch and race dropped from the primary clutch housing install it as follows.
  - o Put the one-way clutch [A] in the clutch housing halfway with the rotation mark [B] facing out.
  - o Fit the race [C] into the one-way clutch and push them together in the clutch housing.

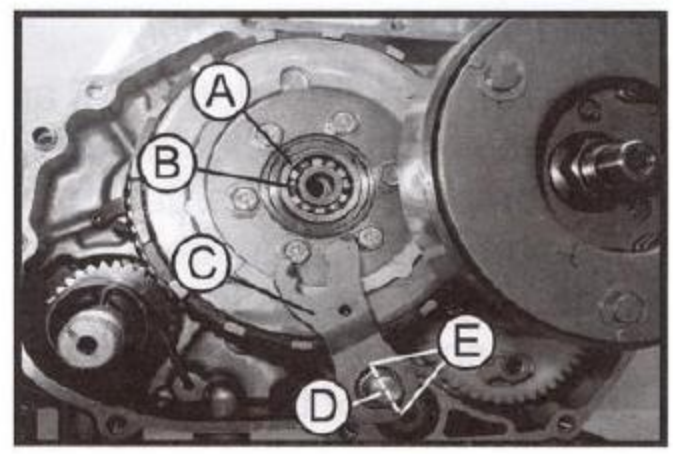


- o Install the plate with the line mark [A] facing out, nothing the proper position.

Clutches

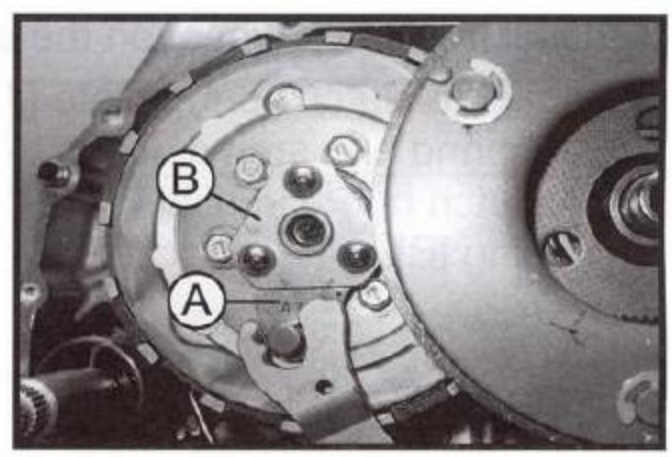
- Install the clutch hub.
- Tighten the primary clutch nut while holding the primary clutch steady with the primary clutch holder.

Special Tool - Primary Clutch Holder:
N9501-1003
Torque - Primary Clutch Hub Nut:
72 N-m (7.3 kg-m, 53 ft-lb)



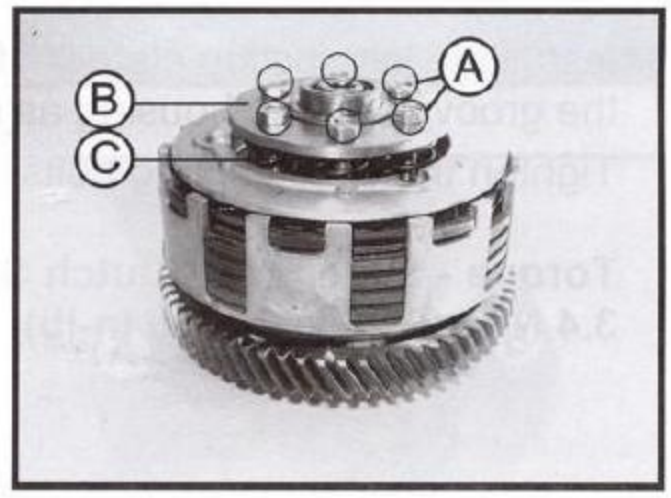
- Install the ball bearing holder [A] and ball bearing [B].
- Install the release lever to the shift shaft [C], with shift shaft line [D] aligning to release lever line [E].

- Apply grease to the release cam and release ball assembly.
- Install the release cam [A] and release ball assembly [B].
- Install the clutch cover.
- Adjust the clutch.

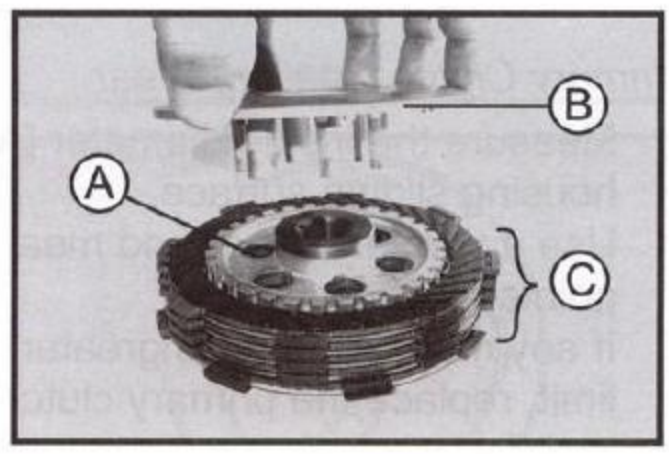


Secondary Clutch Disassembly

- Remove the secondary clutch.
- Unscrew the clutch spring bolts [A] and take off the spring plate [B] and spring [C].

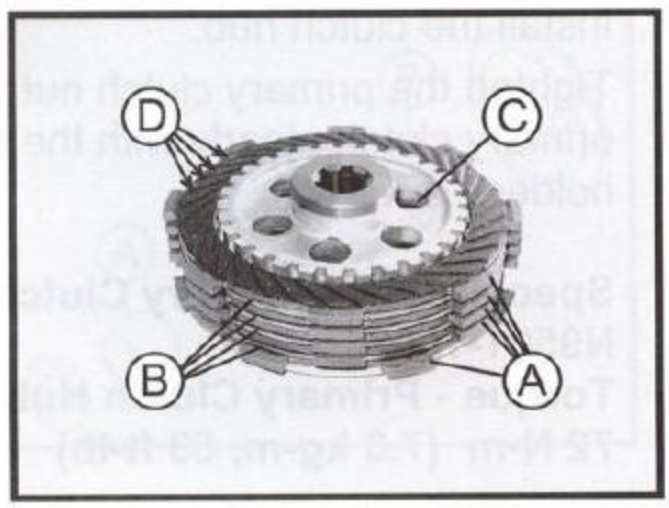


- Remove the clutch hub [A] and clutch wheel [B].
- Remove the secondary clutch plate [B].



Clutches

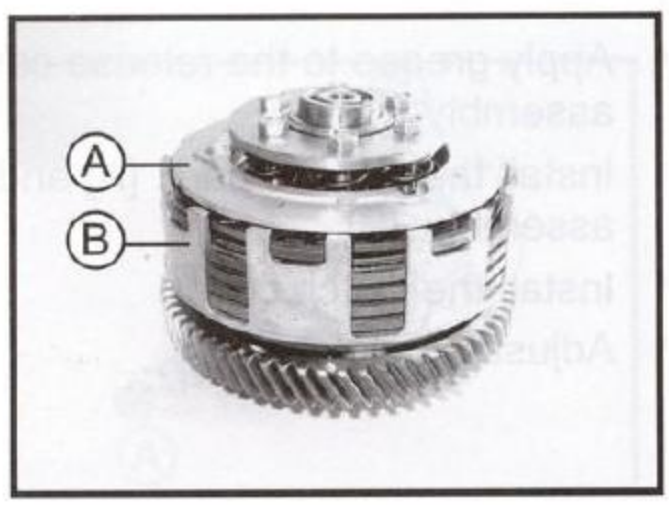
Secondary Clutch Assembly



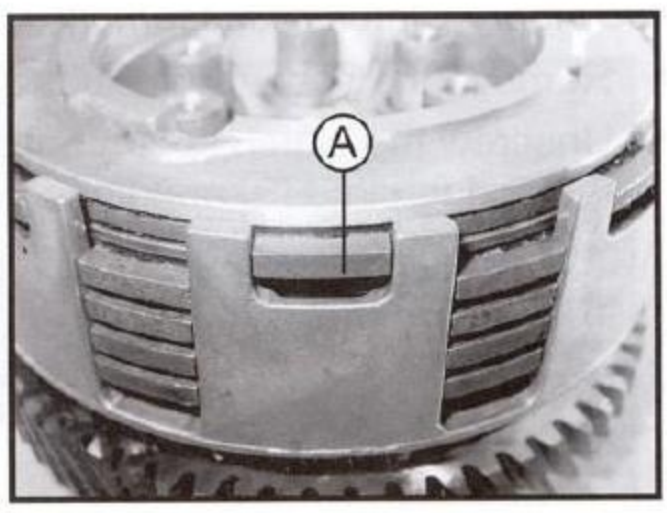
- Install the friction plates [A] and steel plates [B] on the secondary clutch hub [C], starting with a friction plate and alternating them.
  - The grooves [D] on the friction plates surface are cut tangentially and radially. Install the friction plates so that the grooves run toward the center in the direction of the clutch housing rotation (counterclockwise viewed from the engine right side).

CAUTION

If new dry steel plates and friction plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.



- Install the clutch wheel on the clutch hub.
- Install the clutch spring plate [A] with the springs and spring and springs bolts temporarily and fit the clutch hub and plate assembly into the clutch housing [B].



- Install the last friction plate [A] fitting the tangs in the grooves on the housing as shown.
- Tighten the clutch spring bolts.

Torque - Secondary Clutch Spring Bolts: 3.4 N-m (0.35 kg-m, 30 in-lb)

Primary Clutch Housing Wear

- Measure the inside diameter [A] of the clutch housing sliding surface.
  - Use a vernier caliper and measure at several points as shown.
- ★ If any measurement is greater than the service limit, replace the primary clutch housing.

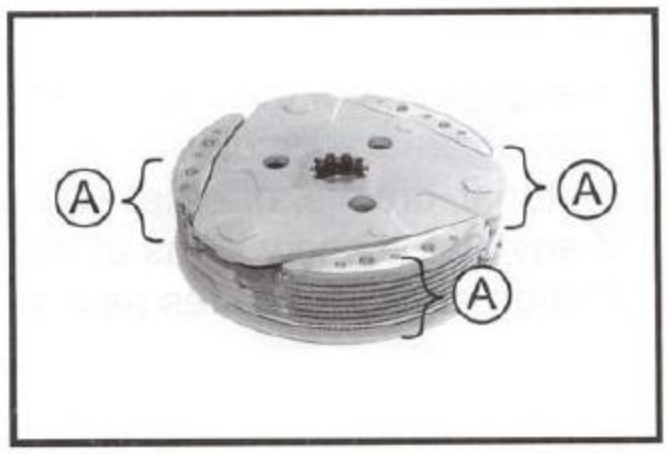
Primary Clutch Housing Inside Diameter
Standard: 104.0 ~ 104.2 mm
Service Limit: 104.5

Clutches

Primary Clutch Shoe Lining Wear

- Remove the primary clutch hub (see Clutch Removal).
- Visually inspect the primary clutch shoe linings [A] for uneven wear, discoloration, missing friction material, cracks or other damage.

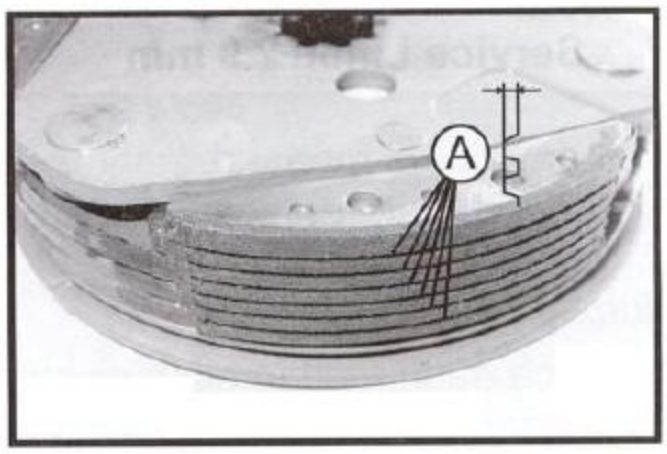
★ If any of the linings are damaged, replace the primary clutch hub.



- Measure the groove depth [A].

o Use a depth gauge, and measure at several points as shown.

★ If any measurement is less than the service limit, replace the primary clutch hub.

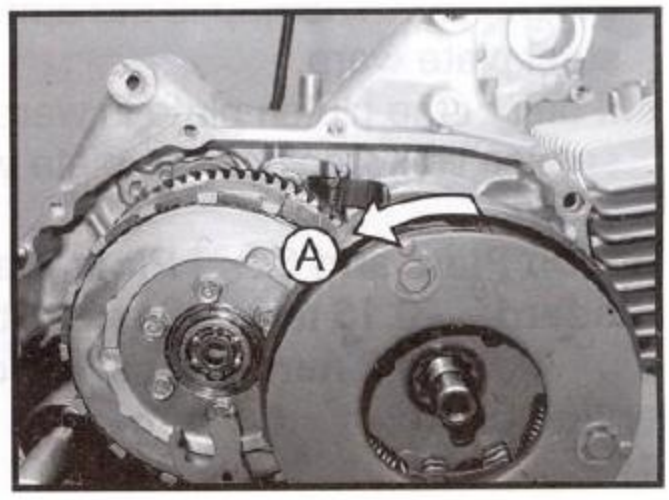


Primary Clutch Shoe Groove Depth

Standard:	**1.0 mm**
Service Limit:	**0.5 mm**

One Way Clutch Inspection

- Remove the clutch cover.
- Turn the primary clutch housing by hand. When view from the right side of the engine, the primary clutch housing should turn counterclockwise freely [A] but should not turn clockwise.



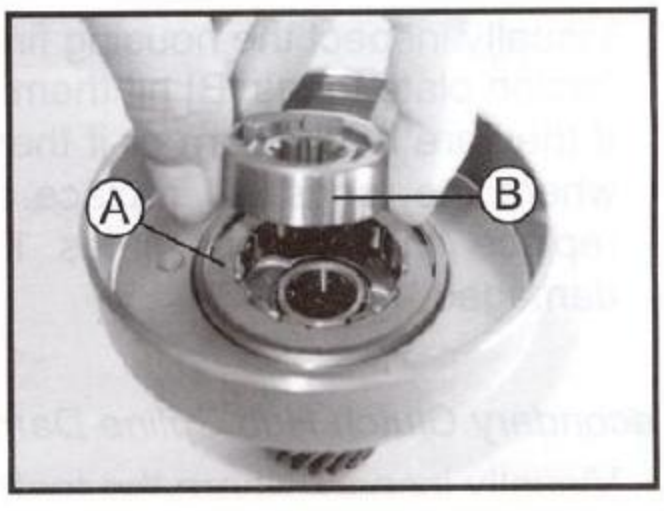
★ If the one-way clutch does not operate as it should or if it makes noise, go to the next steps.

o Remove the primary clutch.

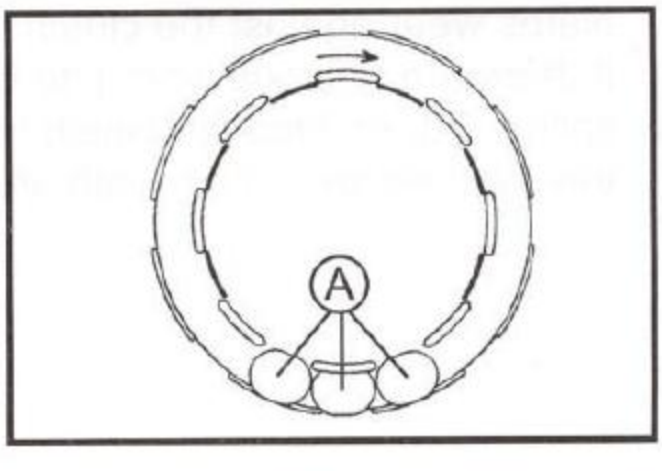
o Check that the one-way clutch is installed so that the rotation mark faces out.

o Visually inspect the one-way clutch [A] and the outer race [B] in the primary clutch housing.

★ If there is any worn or damaged part, replace it.

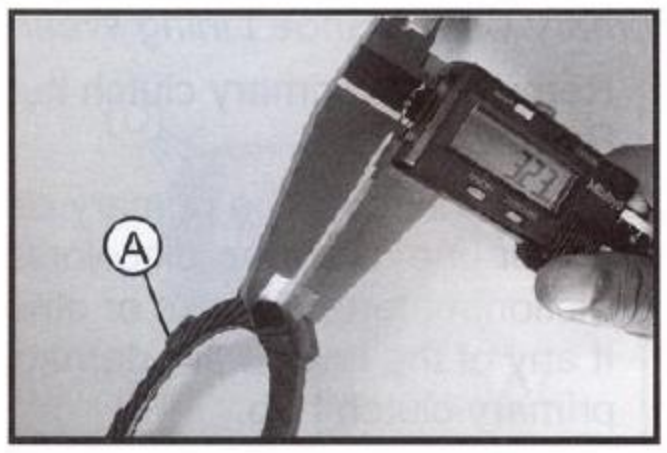


o Check that the rollers [A] in the one-way clutch is installed as shown when viewed from right side of the engine.



Clutches

Clutch Plate Wear and Damage



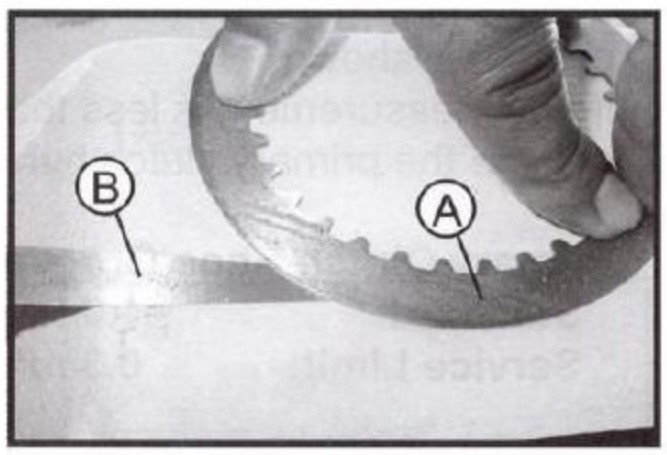
- Visually inspect the friction and steel plates for uneven wear, discoloration, missing friction material, cracks, or other damage.

★ If any plates show signs of damaged, replace the friction and steel plates as a set.

- Measure the thickness of the friction plates [A] at several points.

Friction Plate Thickness
Standard: 3.1 ~ 3.2
Service Limit: 2.9 mm

★ If any of the measurement is less than the service limit, replace the plates as a set.

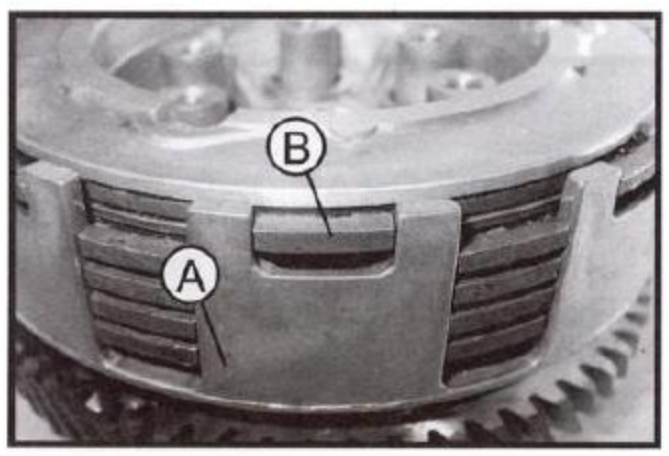


Clutch Plate Warp

- Place each friction plate or steel plate [A] on a surface plate and measure the gap between the surface plate and each plate with a thickness gauge [B]. The gap is the amount of friction and steel plate warp.

★ If any of the clutch plate is warped beyond the service limit, replace the plate with a new one.

Friction Plate and Steel Plate Warp
Standard: 0.15 mm or less (Steel Plate)
0.2 mm or less (Friction Plate)
Service Limit: 0.3 mm



Secondary Clutch Housing Finger Damage

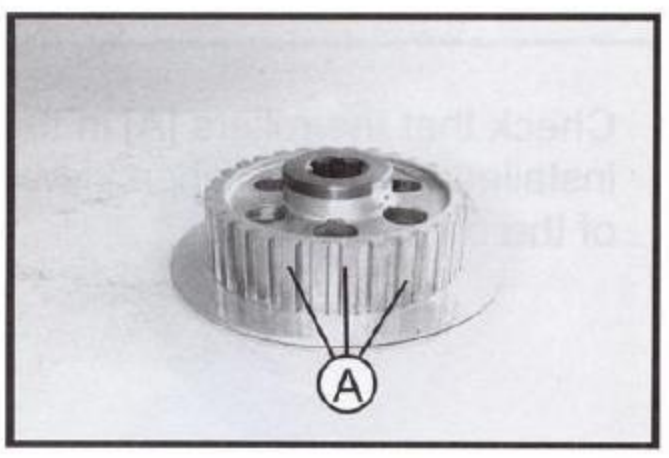
- Visually inspect the housing finger [A] where the friction plate tangs [B] hit them.

★ If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.

Secondary Clutch Hub Spline Damage

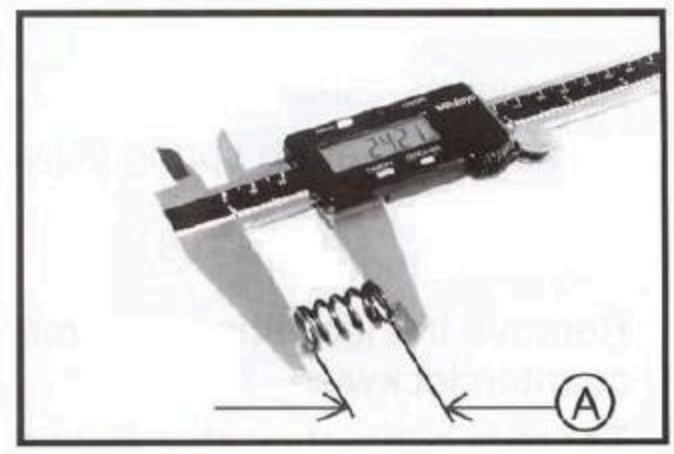
- Visually inspect where the teeth on the steel plates wear against the clutch hub splines.

★ If there are notches worn into the clutch hub spline [A], replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



Clutches

Secondary Clutch Spring Free Length Measurement



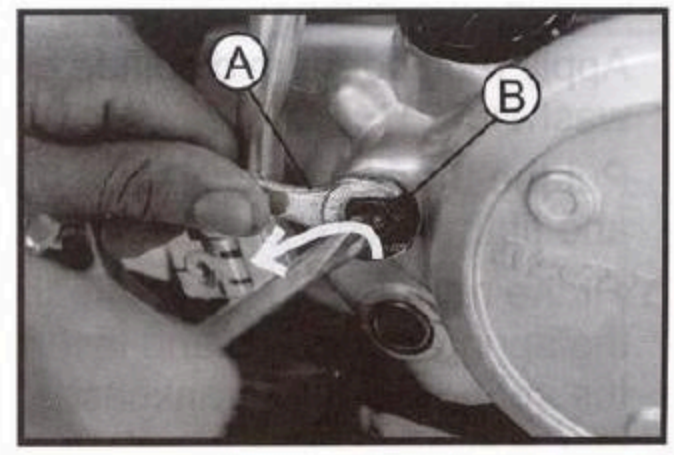
- Measure the spring free length [A].

★ If measurement is less than the service limit, replace it.

Clutch Spring Free Length

Standard:	**24.0 mm**
Service Limit:	**23.0 mm**

Clutch Adjustment

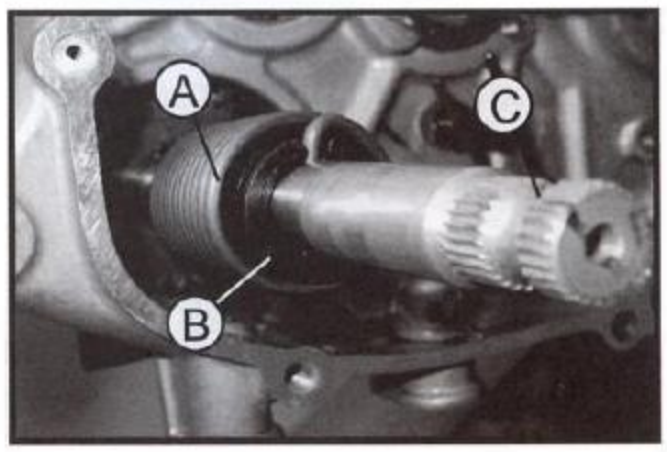


- Loosen the adjusting screw locknut [A].
- Turn the adjusting screw [B] counterclockwise until it becomes hard to turn, and then back it out a quarter turn.
- Tighten the locknut without changing the adjusting screw position.
- Start the engine and inspect the conditions of engine shifting the pedal a few times.

Torque- Adjusting Screw Locknut:
19 N-m (1.9 kg-m, 13.5 ft-lb)

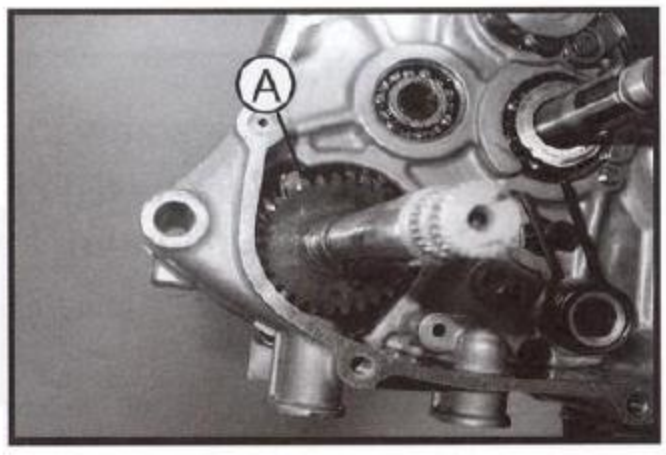
Kickstarter

Kickstarter Removal



- Remove the clutch cover.
- Remove the return spring [A] with pliers.
- Remove:
  Spring Guide [B]
- Remove the kick shaft assembly [C], twisting it counterclockwise.
- There is a thrust washer between the kick shaft end and the crankcase.

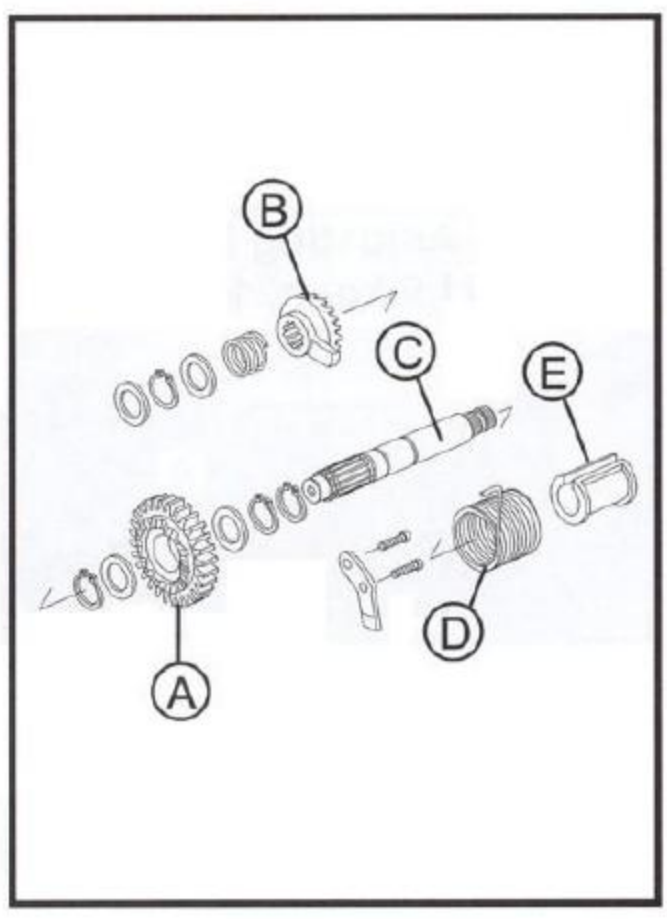
Kickstarter Installation



- Apply molybdenum disulfide grease to the thrust washer.
- Put the thrust washer [A] on the kick shaft end, and fit the kick shaft assembly in the crankcase.
- Fit the return spring end into the kick shaft, turn the spring clockwise and insert the other end of the spring into the crankcase.
- Install the plastic spring guide.
- Install the clutch cover.

Kickstarter Assembly

- Apply a thin coat of molybdenum disulfide grease [A] to the ratchet teeth and the kick gear inside.

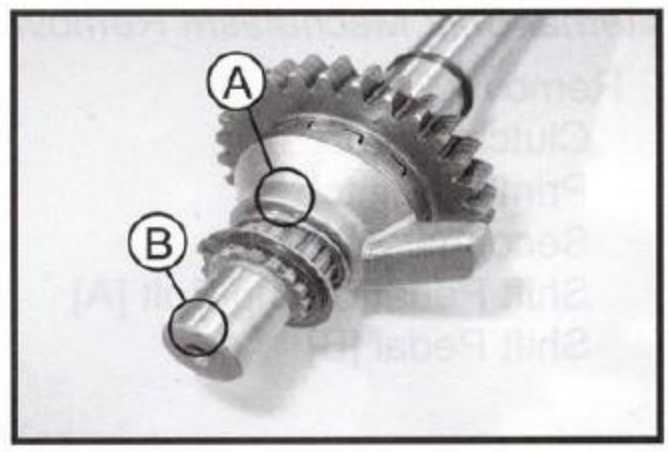


Ratchet [B]
Kick Gear [A]
Kick Shaft [C]
Spring Guide [E]
Return Spring [D]

Kickstarter

Replace the circlips that were removed with new ones.

- Align the ratchet punch mark [A] with the punch mark [B] on the kick shaft.

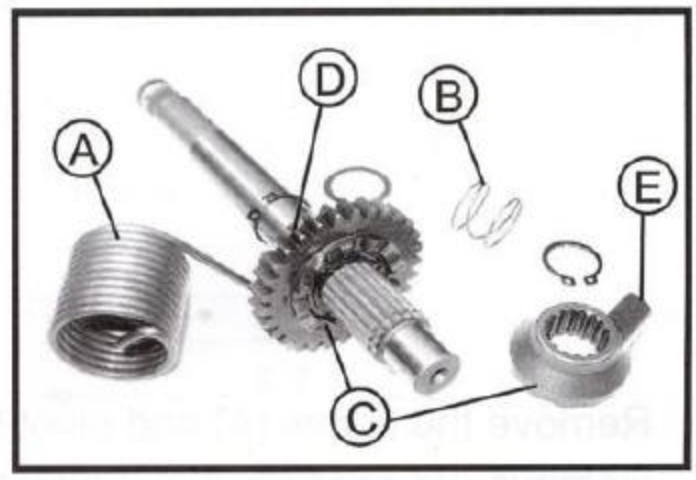


CAUTION
Misalignment of the ratchet changes the kick spring preload. Light preload could cause mechanism noise and heavy preload could weaken or break the spring.

Kickstarter Inspection

- Visually inspect the parts and portion listed below.
  Kick shaft return spring [A]
  Ratchet gear spring [B]
  Ratchet portion [C] of the kick gear [D] and ratchet gear [E]

★ If there is any kind of damage, replace the damaged part.

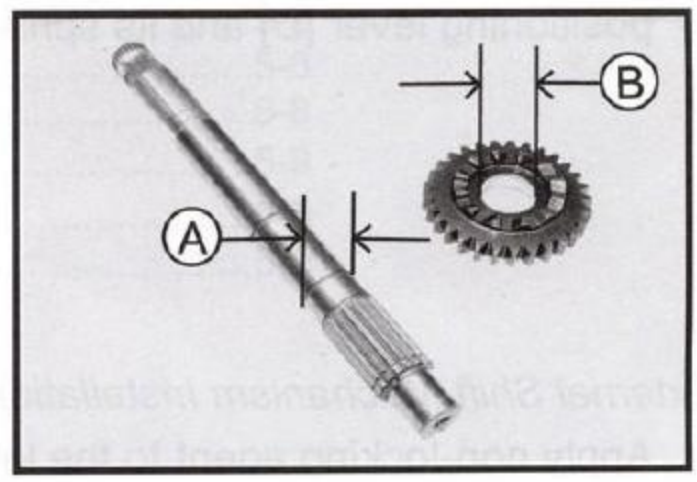


- Measure the kick shaft diameter [A] where the kick gear fits.

★ If it is under the service limit, replace the shaft.

- Measure the inside diameter [B] of the kick gear.

★ If it exceeds the service limit, replace the gear.



Kick Shaft, Kick Gear Diameter

Kick Shaft

Standard: 15.957 ~ 15.984 mm
Service limit: 15.93 mm

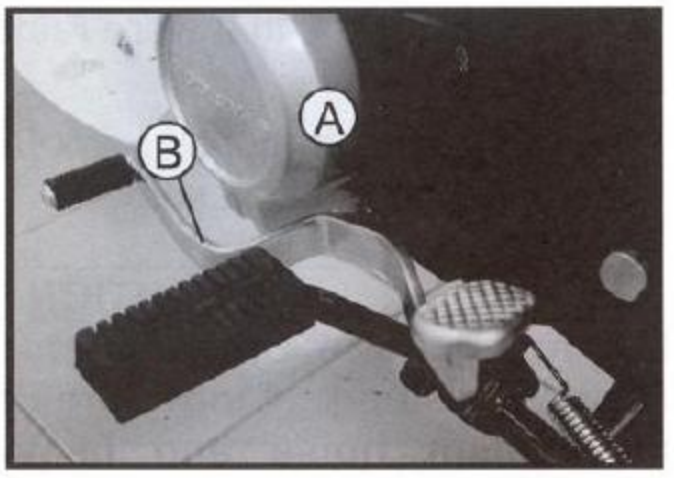
Kick Shaft Gear

Standard: 16.000 ~ 16.018 mm
Service limit: 16.04 mm

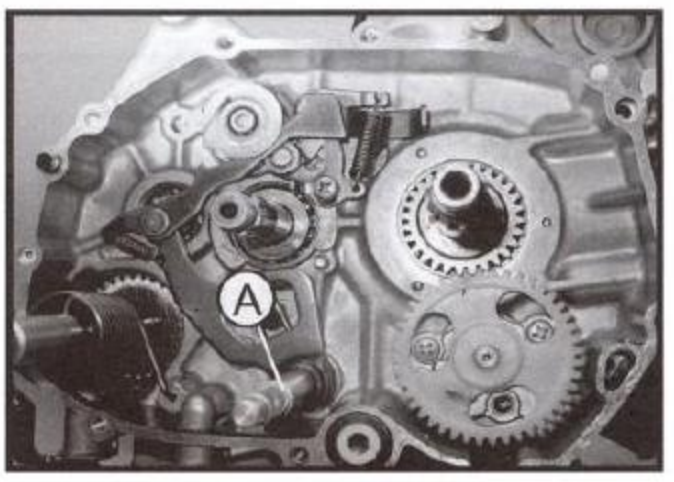
External Shift Mechanism

External Shift Mechanism Removal

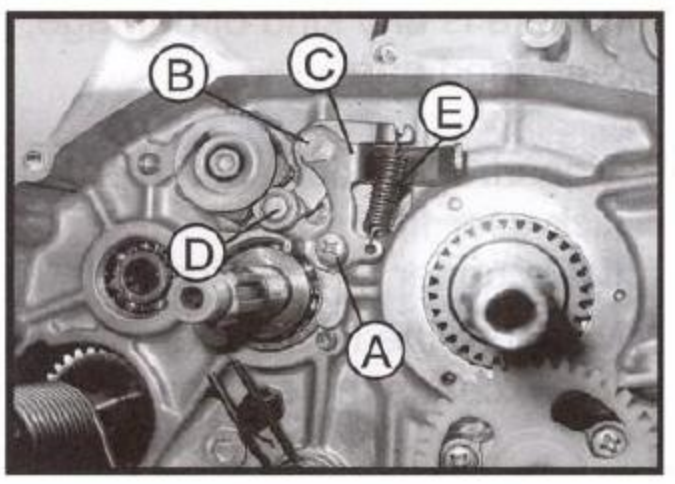
- Remove:
  Clutch Cover
  Primary Clutch
  Secondary Clutch
  Shift Pedal Clamp Bolt [A]
  Shift Pedal [B]



- Move the shift mechanism arm out of its position on the end of the shift drum and pull out the shift shaft [A].

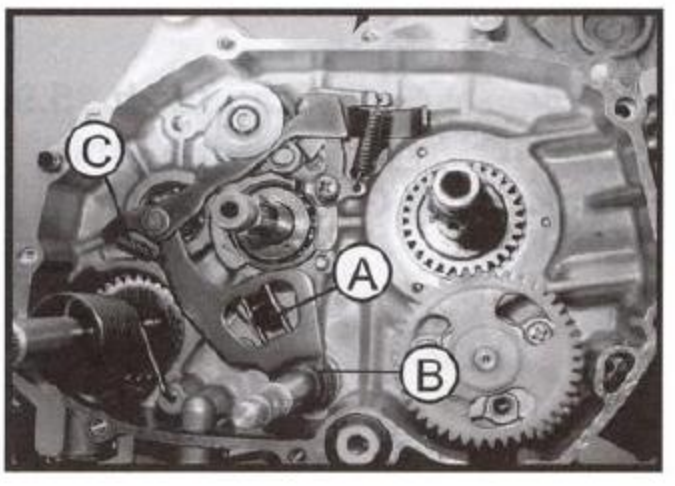


- Remove the screw [A] and pivot bolt [B].
- Remove the gear positioning plate [C], gear positioning lever [D] and its spring [E] as a set.



External Shift Mechanism Installation

- Apply non-locking agent to the lever pivot bolt.
- Install the gear positioning lever, plate and spring.
  - Check that the return spring pin [A] is not loose.
  - Check that the return spring [B] and shift arm spring [C] are properly fitted on the mechanism.



Torque- Shift Drum Positioning Lever Pivot Bolt:
5.4 N-m (0.55kg-m, 48 in-lb)
Shift Drum Position Plate Screw:
5.4 N-m (0.55 kg-m, 48 in-lb)

- Apply high-temperature grease to the oil seal lips.
- Install the shift shaft.
- Install the removed parts.

Torque - Return Spring Pin:
22 N-m (2.2 kg-m, 16 ft-lb)

Engine Lubrication System

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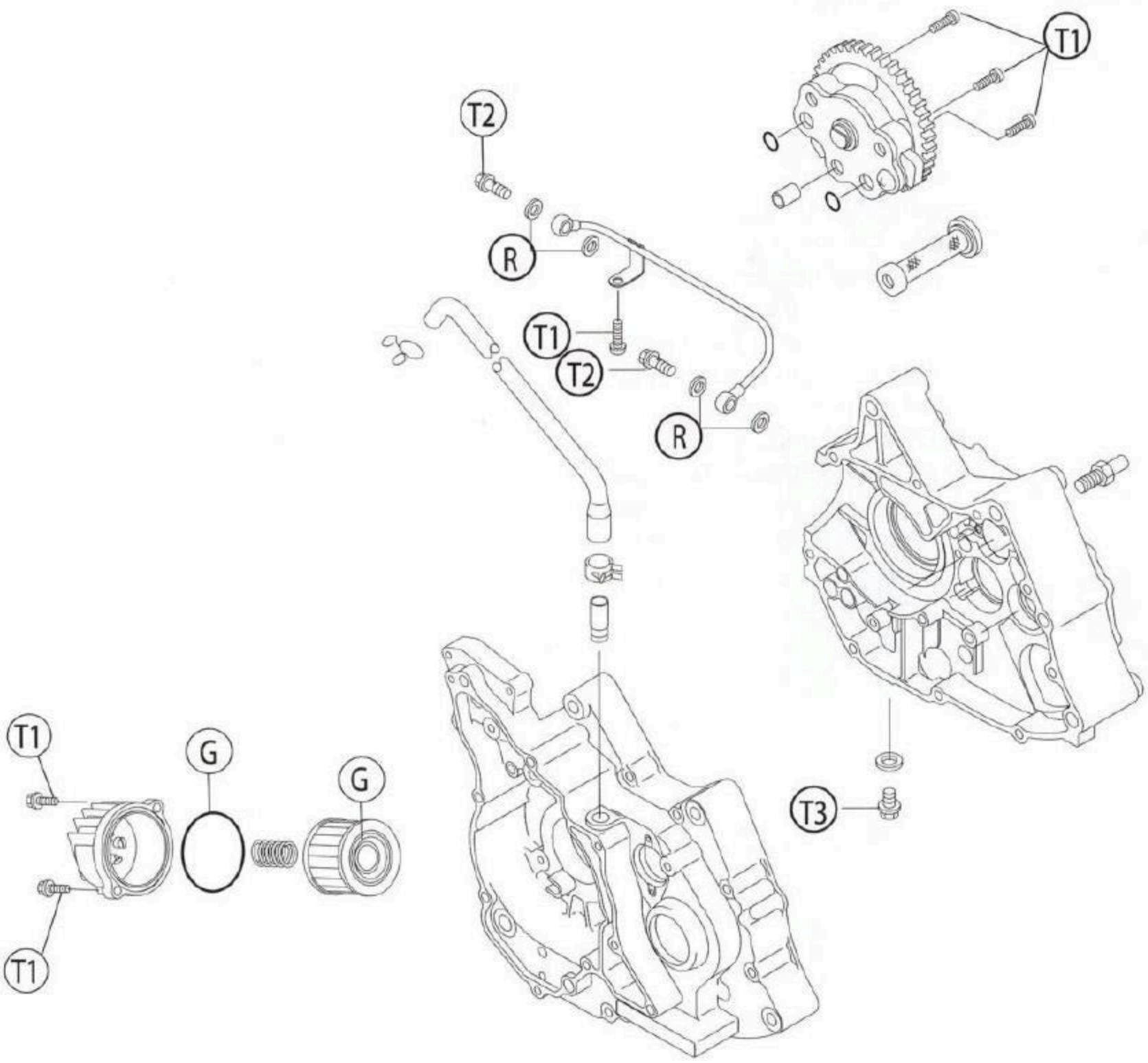
Exploded View



G: Apply grease.
R: Replacement parts

T1: 5.4 N-m (0.55kg-m, 48 ft-lb)
T2: 15 N-m (1.5kg-m, 11 ft-lb)
T3: 29 N-m (3.0 kg-m, 22 ft-lb)

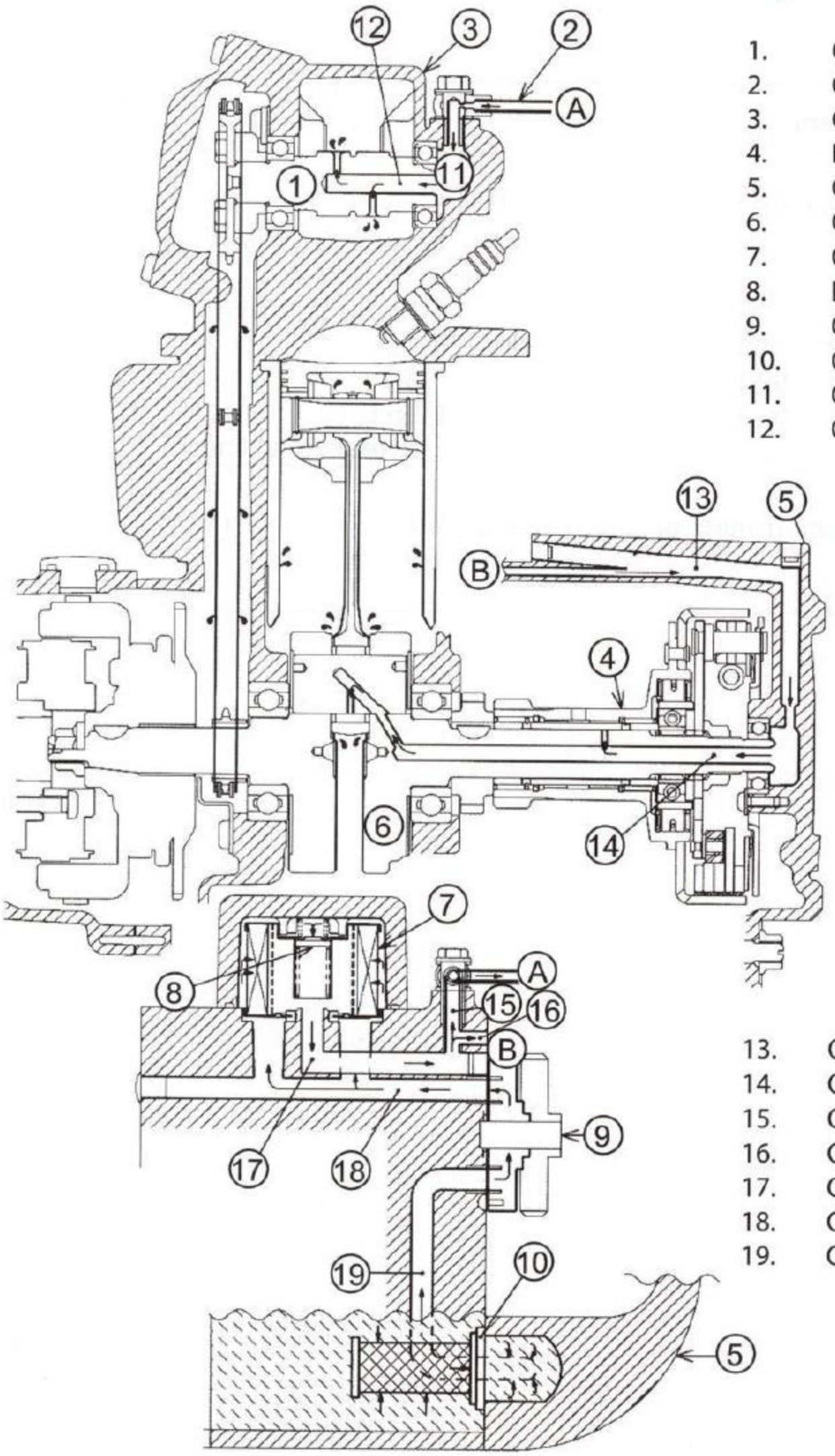
Exploded View

5-3 ENGINE LUBRICATION SYSTEM

Specifications

Item	Standard	Service Limit
Engine Oil:		
Recommended Oil:	Shell 4T	
Grade:	SF or SG class	---
Viscosity:	SAE 10W-40, 10W-50 or 20W-50	---
Amount:		
(When engine is completely dry)	1.1 L	---
(When filter is removed)	1.0 L	---
(When filter is not removed)	0.95 L	---
Level	Between level lines	---
Oil Pressure Measurement: Oil pressure @2000 rpm (r/min) oil temp. 60°C (140°F)	98 kPa (1.0 kg/cm^2, 57 psi)	---

Specifications



Engine Oil Lubrican System.

1. Camshaft.
2. Oil Pipe.
3. Cylinder Head.
4. Primary Clutch Housing.
5. Clutch Cover.
6. Crank Shaft.
7. Oil Filter.
8. Bypass valve.
9. Oil Pump.
10. Oil Screen.
11. Oil Passage. (Cylinder Head)
12. Oil Passage. (Camshaft)
13. Oil Passage. (Right Engine Cover)
14. Oil Passage. (Crankshaft)
15. Oil Passage to Cylinder Head.
16. Oil Passage to Crank Shaft.
17. Oil Passage from Oil Filter.
18. Oil Passage to Oil filter.
19. Oil Passage to Oil Pump.

Engine Oil

In order for the transmission and clutch to function properly, always maintain the engine oil at the proper level and change the oil periodically.

⚠ WARNING

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated, wear and may result in transmission seizure, accident and injury .

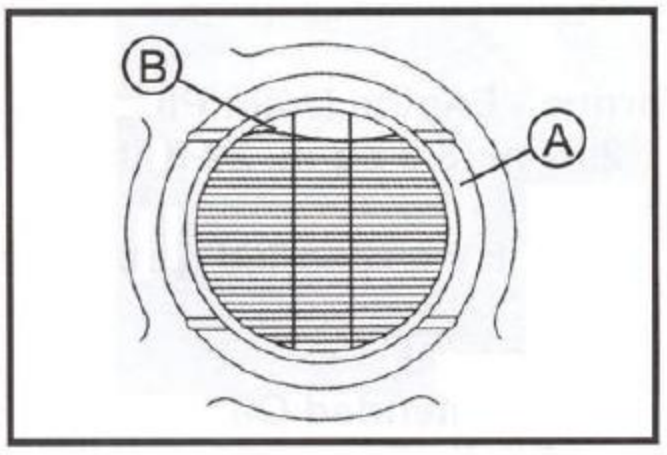
Oil Level Inspection

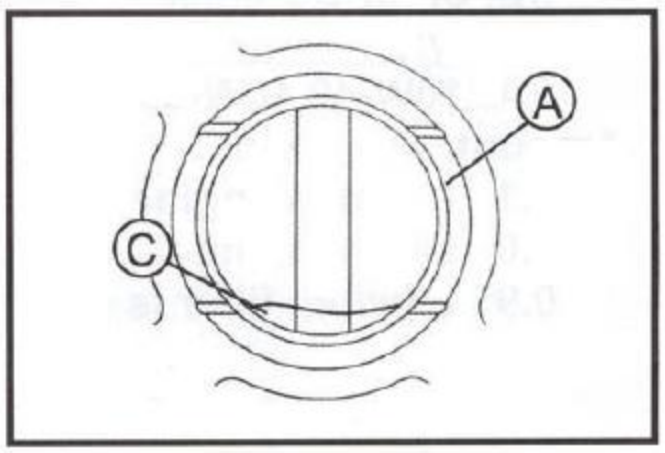
- To check the oil level, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Then stop the engine and wait several minutes until the oil settles.
- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- Situate the motorcycle so that it is perpendicular to the ground.
- Check the oil level through the oil level gauge [A].

★ The oil level should be between the lines next to the gauge.

★ If the oil level is too high [B], remove the excess oil, using a syringe or some other suitable device.

★ If the oil level is too low [C], add oil through the oil filler opening. Use the same type and make of oil that is already in the engine.



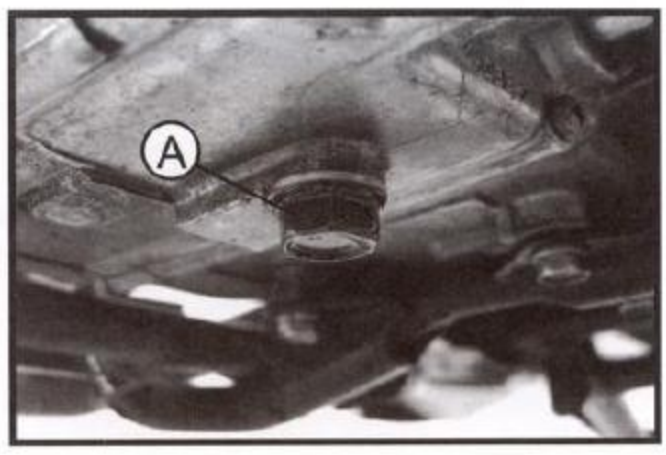


NOTE

o *If the oil must be refilled but the type and brand of the oil already in the engine are unidentified, change the oil in the engine completely.*

Oil Changing

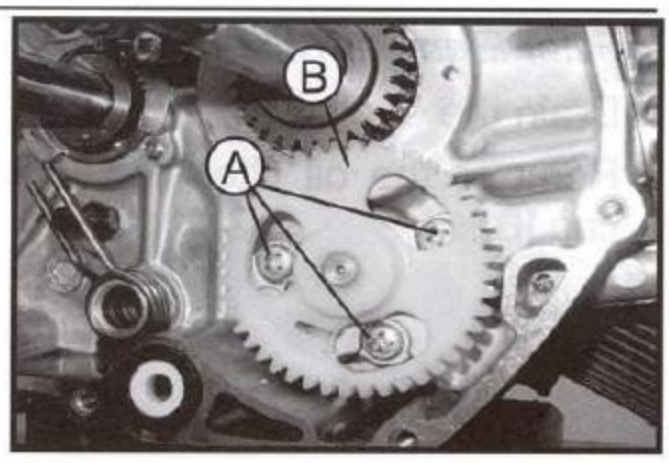
- Support the motorcycle perpendicular to the ground.
- Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily. Then stop the engine.



Engine Oil Pump

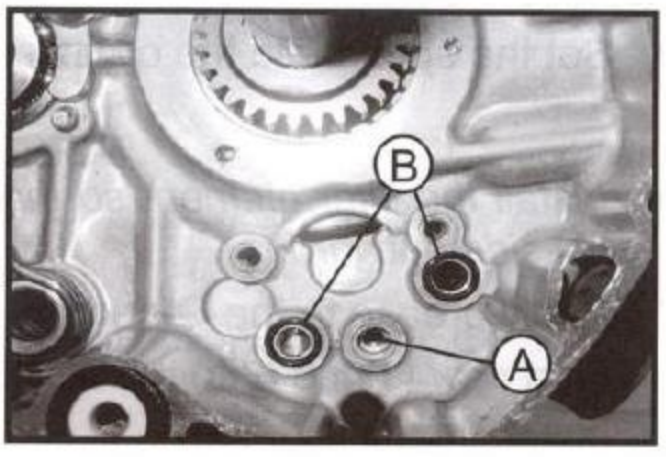
Engine Oil Pump Removal

- Remove the clutch cover (see Clutch chapter) .
- Remove the clutch assembly and primary gear (see Clutch chapter).
- Turn the crankshaft so that the engine oil pump screws [A] can be removed through the pump gear holes, and remove the screws and oil pump [B].



Engine Oil Pump Installation

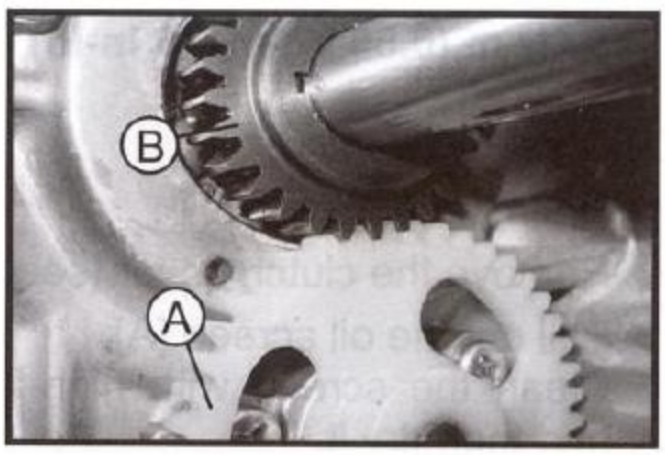
- Replace the O-rings with new ones if they are damaged.
- Check to see that the knock pin [A] and O-rings [B] are in place.



Install the oil pump and screws.

o When installing the oil pump, be sure the oil pump gear [A] and pump drive gear [B] on the crankshaft mesh properly.

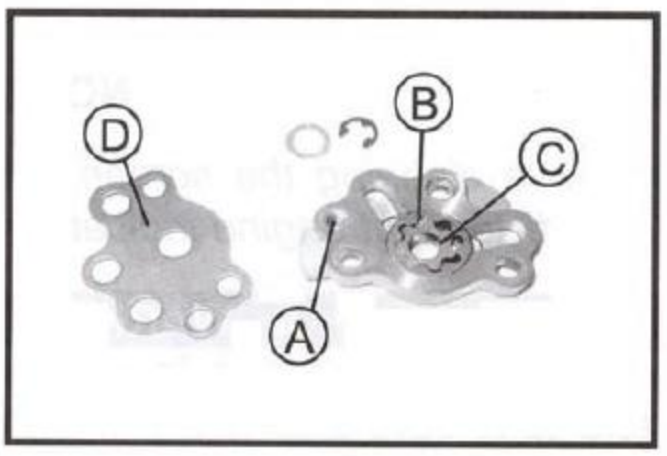
Torque - Oil Pump Mount Screw :
5.4 N-m (0.55 kg-m, 48 in-lb)



Engine Oil Pump Inspection

- Visually inspect the oil pump body [A], outer [B], inner rotor[C] and cover [D].

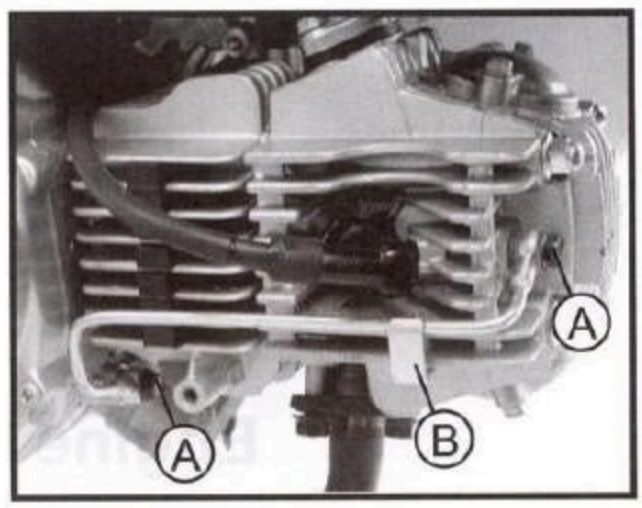
★ If there is any damage or uneven wear, replace the rotors or oil pump assembly.



Engine Oil Pipe

Oil Pipe Removal

- Remove the right leg shield (see Frame chapter).
- Remove the banjo bolts [A] and oil pipe clamp screw [B].



Oil Pipe Installation

- Before installation, flush out the pipe with a high flash point solvent.
- Discard the used copper washers and install new washers on each side of the pipe fittings.
- Lightly tighten the banjo bolts and oil pipe clamp screw to a snug fit, and tighten them to the specified torque.

Torque - Oil Pipe Banjo Bolts:
15 N-m (1.5 kg-m, 11.0 ft-lb)
Oil Pipe Clamp Screw :
3.4 N-m (0.55 kg-m, 48 in-lb)

Engine Removal / Installation

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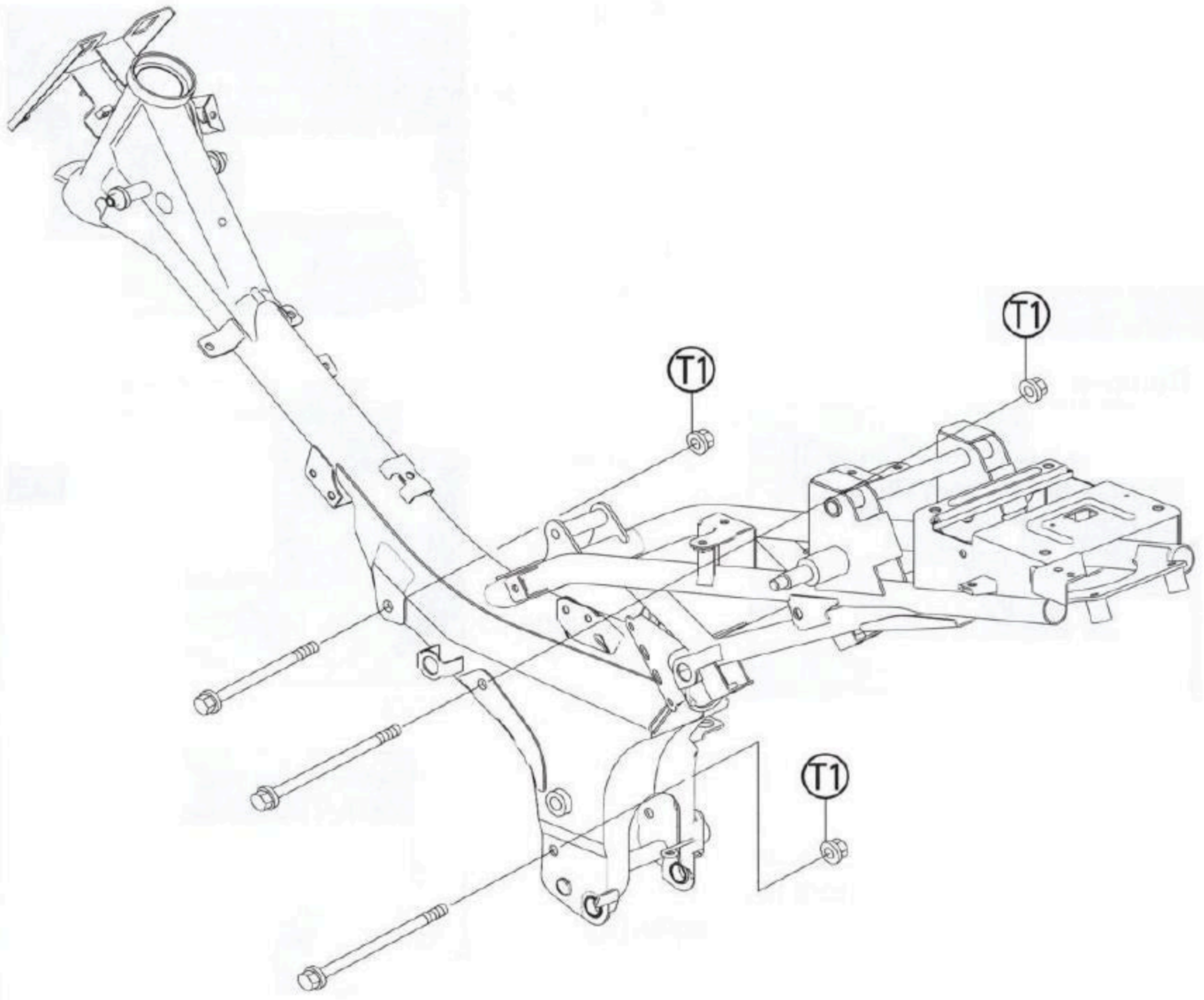
Exploded View

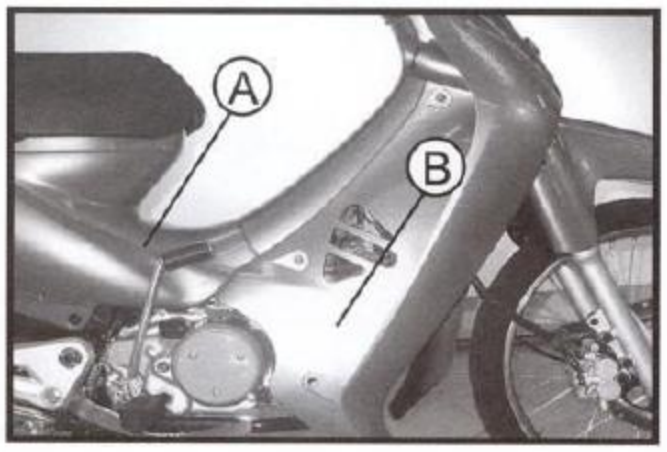


T1: 34 N-m (3.5 kg-m, 25 ft-lb)

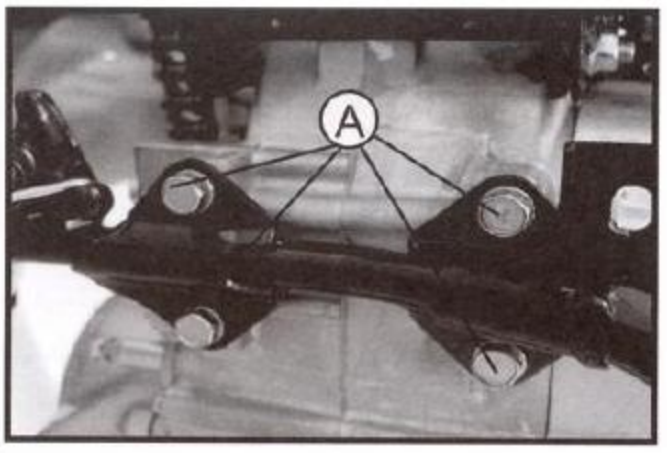
Engine Removal/Installation

Engine Removal

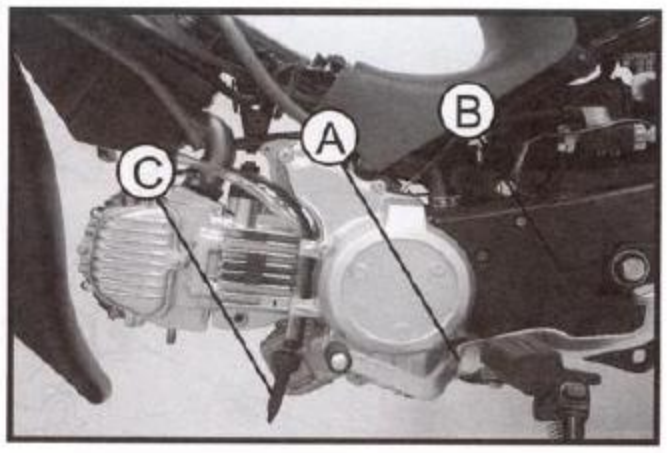
- Drain the engine oil (see Engine Lubrication chapter).
- Remove:
  Left & Right Leg Shields (see Frame chapter) [A]
  Left & Right Side Covers (see Frame chapter) [B]



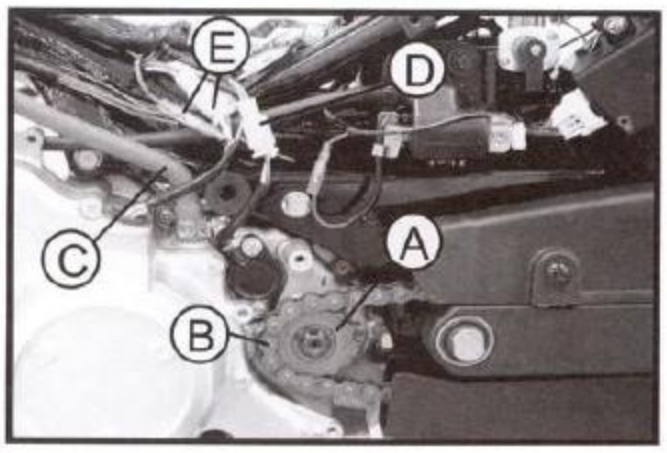
- Remove the nuts [A] and take off the Front Footpeg Bracket [B] with Side Stand



- Remove
  Shift Pedal [A]
  Engine Sprocket Cover [B]
  Air Cleaner Drain Plug [C]



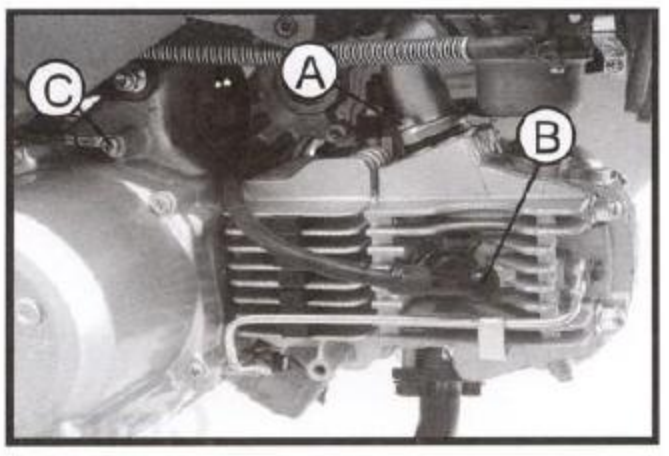
Engine Sprocket [A]
Drive Chain [B]
Breather Tube Lower End [C]
Magneto Lead Connectors [D]
Gear Position Switch Lead Connector [E]



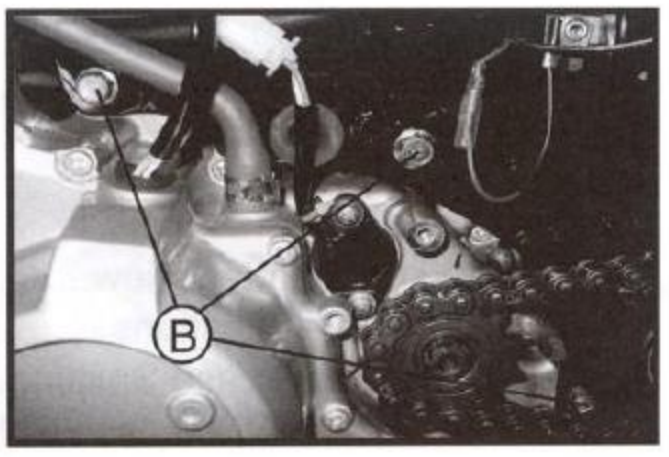
Muffler

Engine Removal/Installation

Intake Pipe Bolts [A]
Spark Plug Cap [B]
Engine Earth [C]

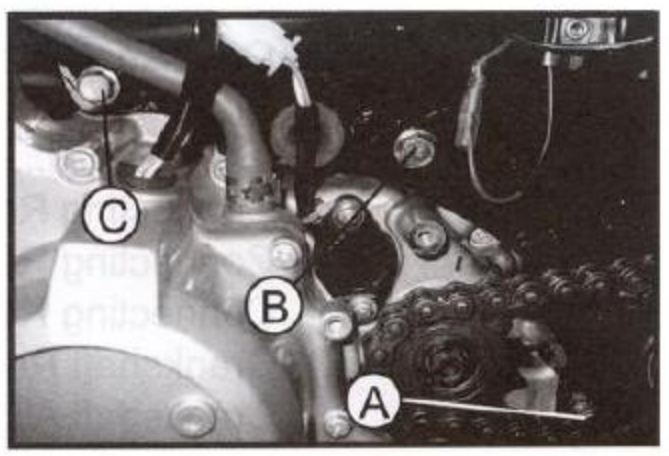


- Disconnect the starter motor lead from the starter motor relay. (AN110-F1)



- Support the engine with a suitable stand.
- Remove the three engine mounting bolts [A] and dismount the engine.

Engine Installation



- Support the engine with a suitable stand and set it at the correct position.
- Insert the lower engine mounting bolt [A] from left side of the engine.
- Install the middle [B] and upper [C] engine mounting bolts.
- Tighten the engine mounting nuts.

Torque - Engine Mounting Nuts:
34 N-m (3.5 kg-m, 25 ft-lb)

- Install the removal parts.
- Adjust the drive chain (see Final Drive chapter).

Crankshaft / Transmission

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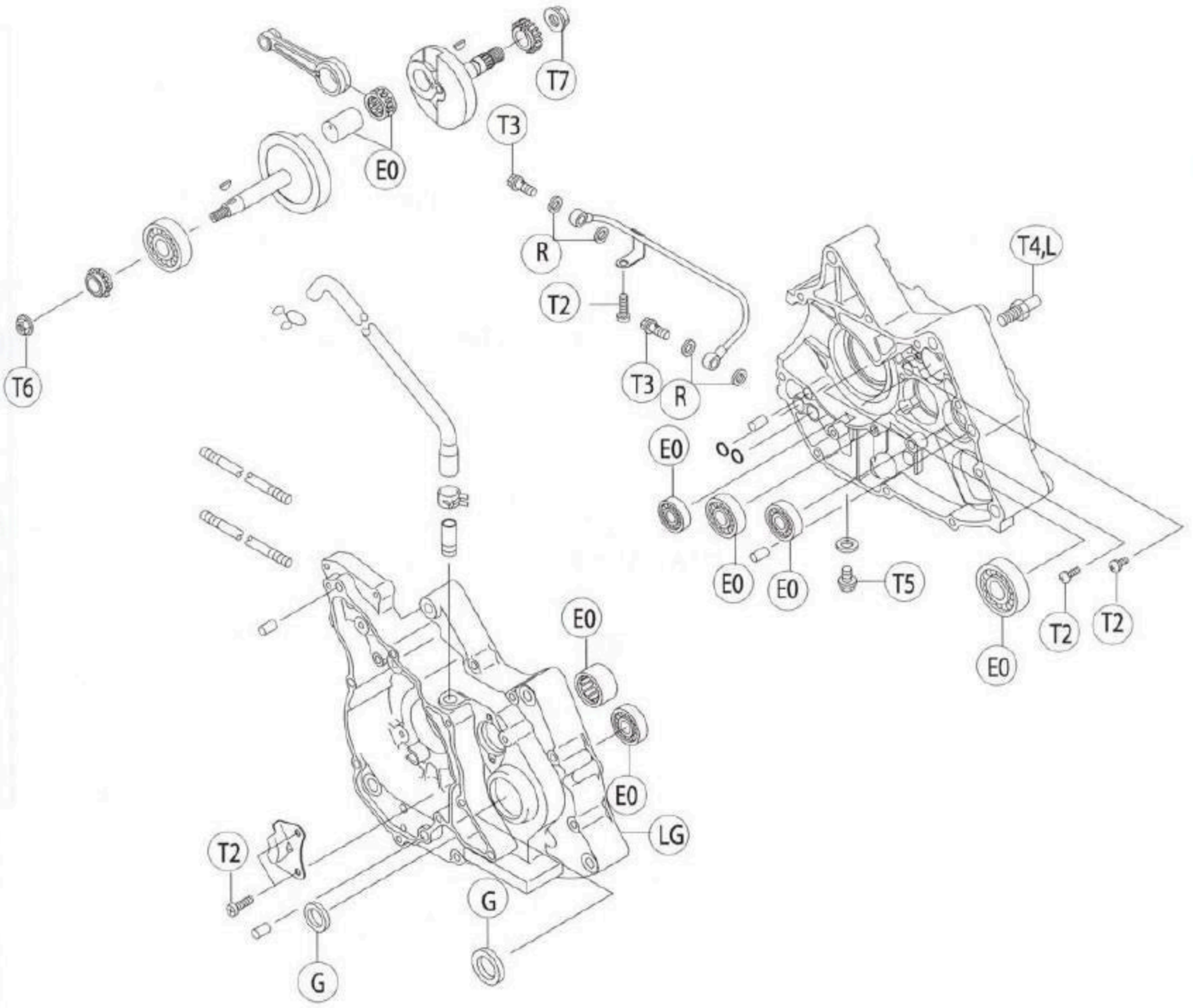
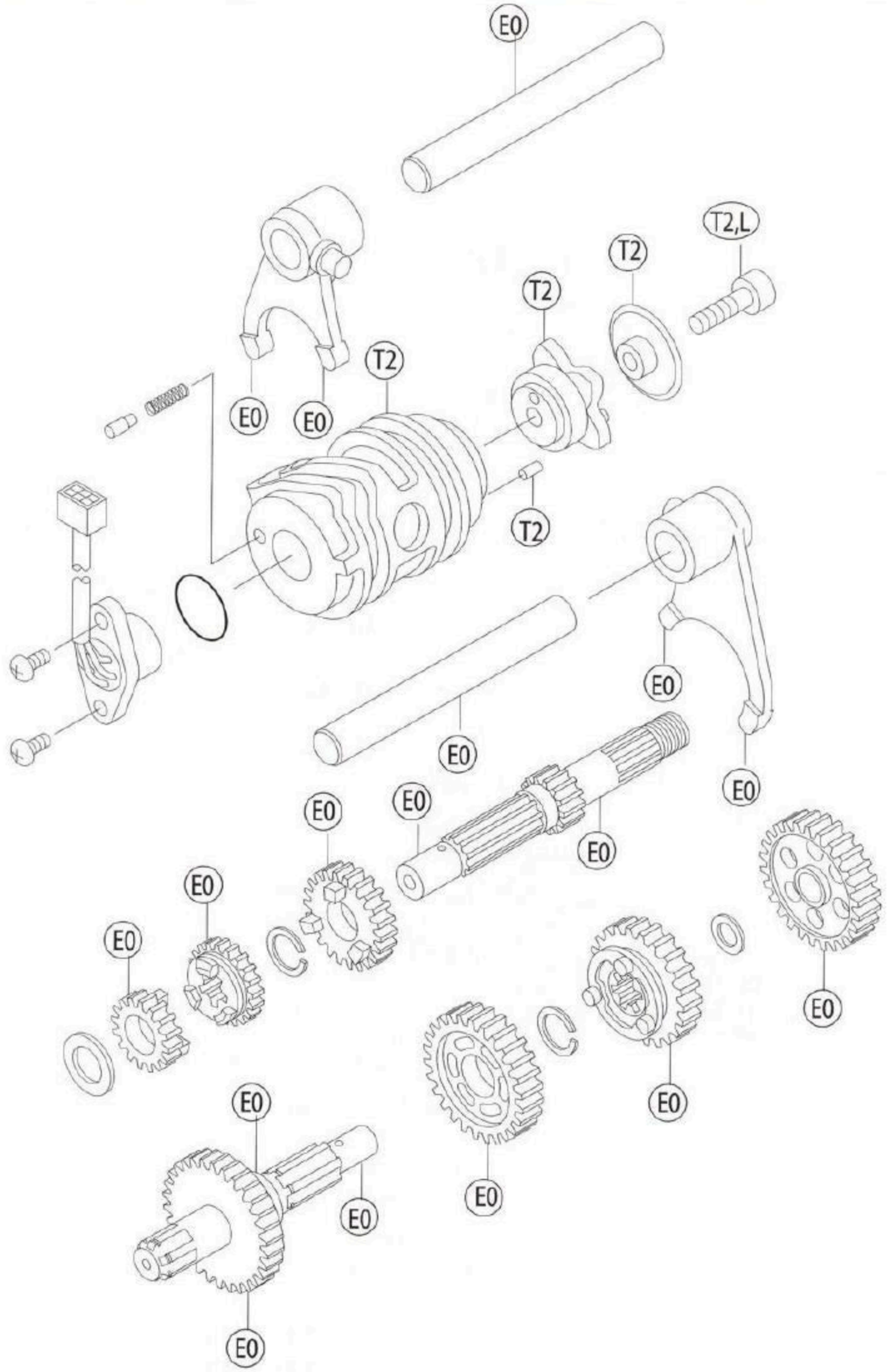
Exploded View



EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
R: Replacement Parts.
S: Follow the specific tightening sequence.

T1: 2.9 N-m (0.3 kg-m, 26 in-lb)
T2: 5.4 N-m (0.55 kg-m,48 ft-lb)
T3: 15 N-m (1.5 kg-m, 11 ft-lb)
T4: 22 N-m (2.2 kg-m, 16 ft-lb)
T5: 29 N-m (3.0 kg-m, 22 ft-lb)
T6: 42 N-m (4.3 kg-m, 31 ft-lb)
T7: 72 N-m (7.3 kg-m, 53 in-lb)

Exploded View



L: Apply a non-permanent locking agent.

EO: Apply engine oil.

T2: 5.4 N-m (0.55 kg-m,48 ft-lb)

7-4 CRANKSHAFT / TRANSMISSION

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Connecting rod:		
Big end radial clearance	0.009 ~ 0.023 mm	0.07 mm
Big end side clearance	0.1 ~ 0.2 mm	0.4 mm
Crankshaft runout	Less than 0.03 TIR	0.08 mm
Transmission:		
Shift fork ear thickness	3.9 ~ 4.0 mm	3.8 mm
Gear shift fork groove width	4.05 ~ 4.15 mm	4.3 mm
Shift fork guide pin diameter	4.9 ~ 5.0 mm	4.8 mm
Shift drum groove width	5.05 ~ 5.20 mm	5.3 mm

Special Tools - Outside Circlip Pliers: 57001-144
Bearing Puller: 57001-158
Crankcase Splitting Tool Assembly: 57001-1098
Bearing Driver Set: 57001-1129
Crankshaft Jig: 57001-1174

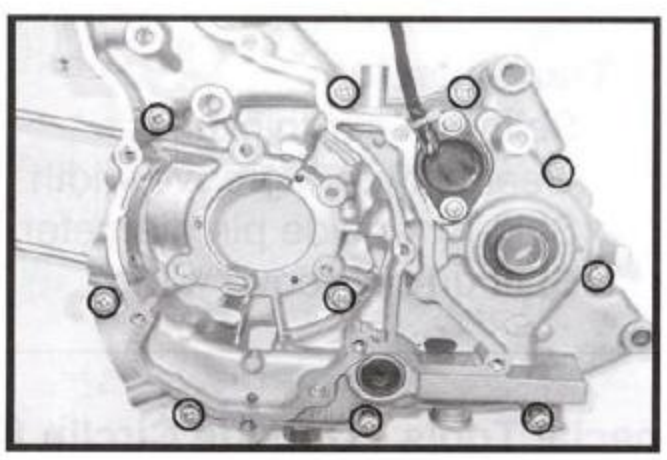
Sealant - Silicone Sealant: 56019-120
Liquid Gasket Black: 92104-1003

Crankcase Splitting

Crankcase Splitting

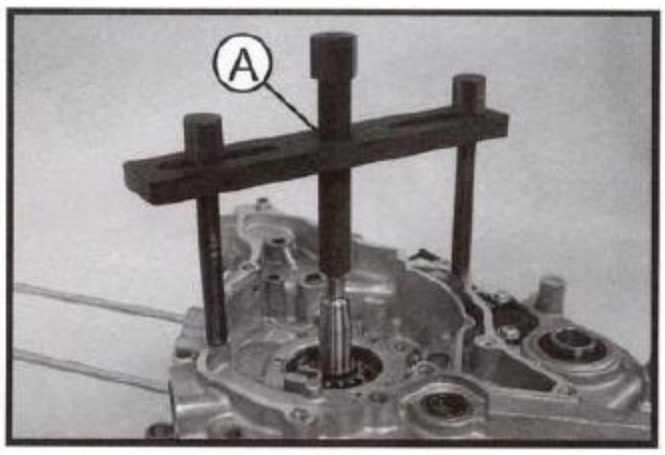
- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:

  Cylinder Head (see Engine Top End chapter)
  Cylinder (see Engine Top End chapter)
  Piston (see Engine Top End chapter)
  Clutch Cover (see Clutch chapter)
  Primary Clutch, Secondary Clutch (see Clutch chapter)
  Kick Shaft (see Clutch chapter)
  Oil Filter & Oil Pump (see Engine Lubrication System chapter)
  External Shift Mechanism (see Clutch chapter)
  Magneto Cover (see Electrical System chapter)
  Magneto Flywheel (see Electrical System chapter)
  Starter Motor & Gear (AN110-B1, see Electrical System chapter)
  Gear Position Switch
  Crankcase Screws [O]



- Using the crankcase splitting tool assembly [A], split the crankcase.

  Special Tool - Crankcase Splitting Tool Assembly: 57001-1098



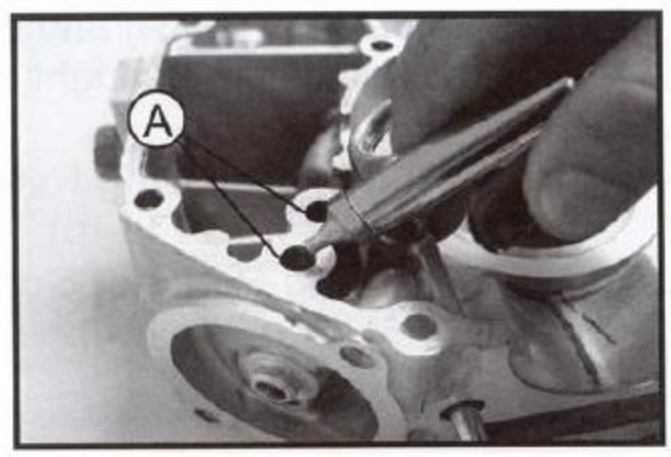
- Once the crankcase is split, remove the crankcase splitting tool and separate the crankcase halves.
- Remove the crankshaft from the crankcase half using a press.

CAUTION
Do not remove the ball, needle bearings and the oil seals unless it is necessary. Removal may damage them.

- Press the remaining bearing out of the crankcase half if the bearing remains on the crankcase half.

Crankcase Splitting

Crankcase Assembly



CAUTION

Right and left crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- Chip off the old gasket from the mating surfaces of the crankcase halves.
- Using compressed air, blow out the oil passages [A] in the crankcase halves and the crankshaft.
- With a high-flash point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.

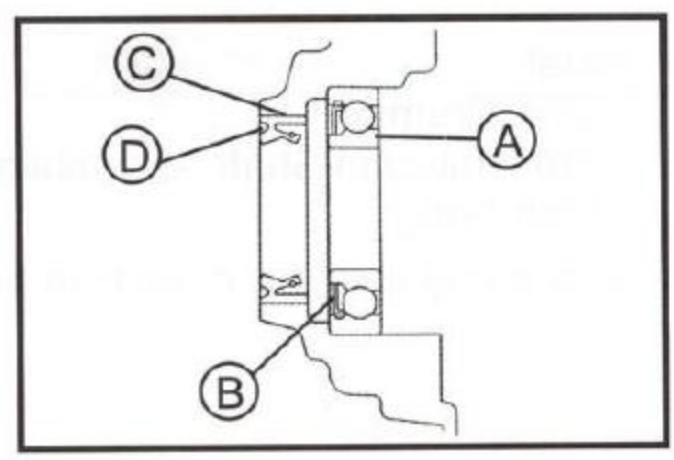
⚠ WARNING

Clean the engine parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash point solvent to clean parts. A fire or explosion could result.

NOTE

- *If the crankcase stud bolt is removed, apply non permanent locking agent to the lower crankcase stud bolts.*

- Using a press and the bearing driver set, install new bearings until they bottoms out.
- Press the output shaft bearing [A] in the left crankcase half so that the shielded side [B] faces to the oil seal.



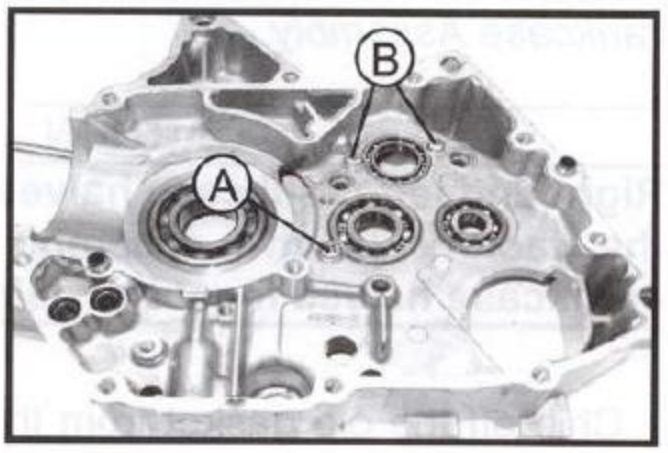
Special Tool - Bearing Driver Set:
57001-1129

- Apply high-temperature grease to the lips of the oil seals.
- Press in the oil seals [C] of the left crankcase half so that the seal surface is flush [D] with the end of the hole.

Crankcase Splitting

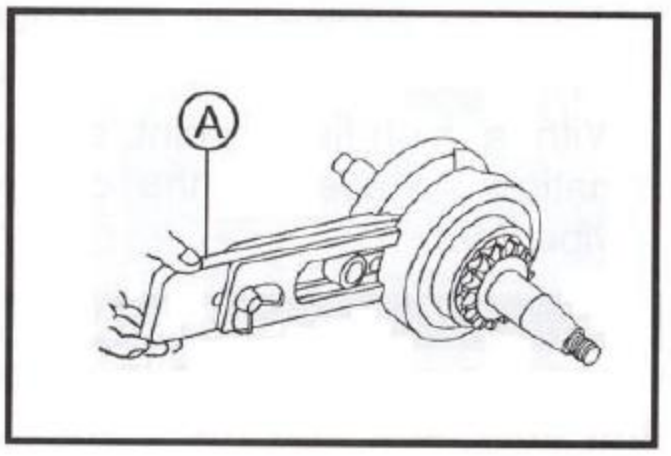
- Tighten the shift drum [A] and drive shaft bearing retainer screws [B] to the right crankcase.

Torque - Shift Drum Bearing RetainerScrews:
2.9 N-m (0.3 kg-m, 29 in-lb)
Drive Shaft Bearing Retainer Screw:
5.4 N-m (0.55kg-m, 48 in-lb)

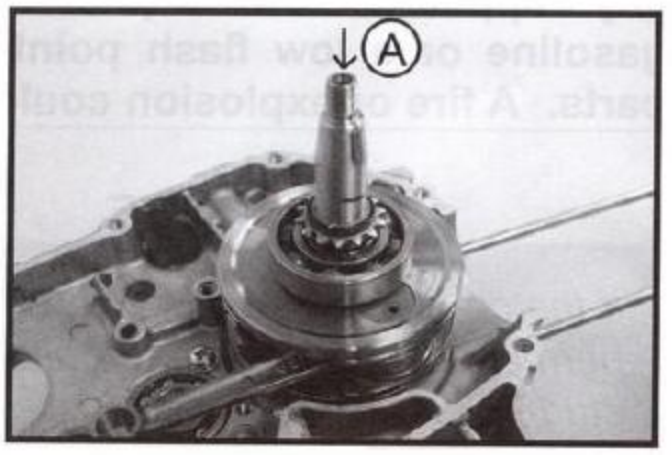


- Insert the crankshaft jig [A] between the crankshaft flywheels opposite the connecting rod big end to protect flywheel alignment. This tool is easily adjustable to fit in any gap between the flywheel.

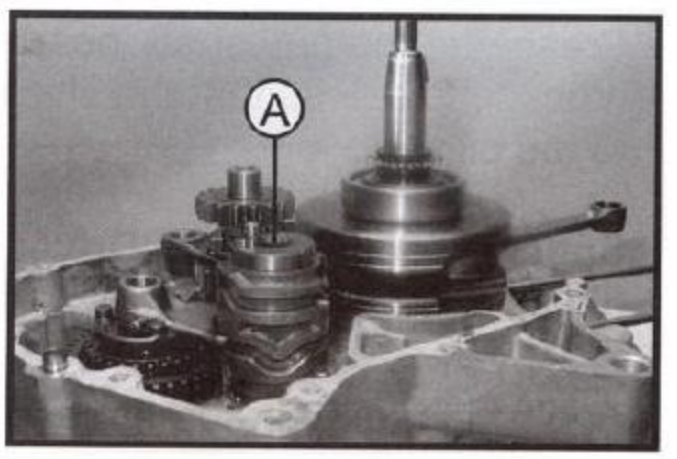
Special Tool - Crankshaft Jig: 57001-1174



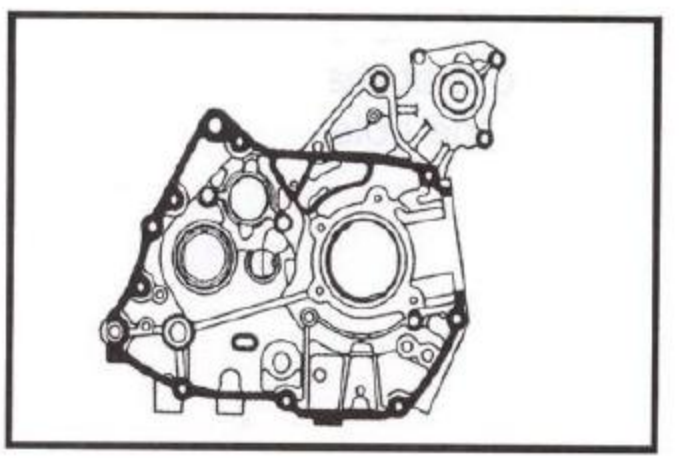
- Fit the crankshaft into the right crankcase half using a press [A].



- Install:
  Shift Drum [A]
  Transmission Shaft Assemblies.
  Shift Forks.
- Check that the shift drum is in neutral position.

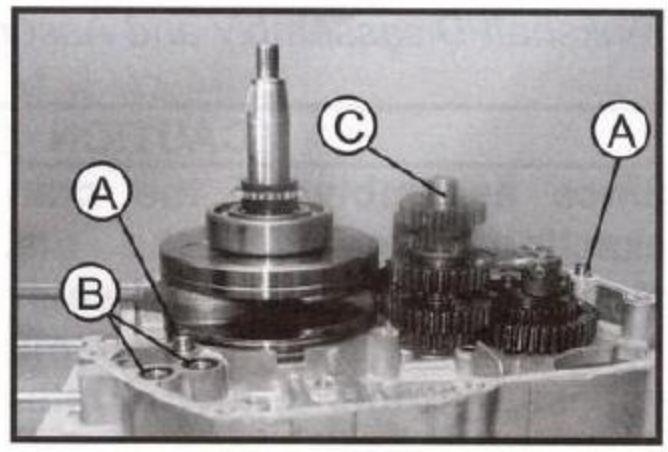


- Make sure that the mating surfaces of the crankcase halves are completely free of oil or contamination.
- Apply liquid gasket to the mating surface of the left crankcase half as shown.



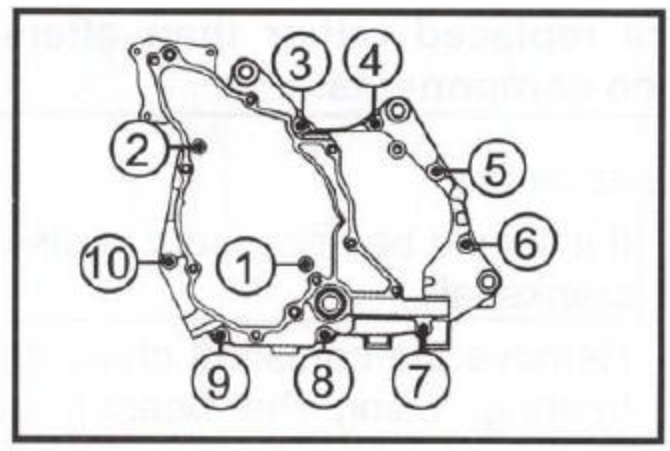
Crankcase Splitting

- Check that two dowel pins [A], O-rings [B] and drive shaft spacer [C] in place.
- Fit the crankcase halves together hitting with a plastic hammer on the left crankcase side.



- Apply non permanent locking agent to the No. 10 crankcase screw as shown.
- Tighten the crankcase screws [A] in that order shown.

Tightening Torque - Crankcase Screws:
5.4 N-m (0.55 kg-m, 48in-lb)



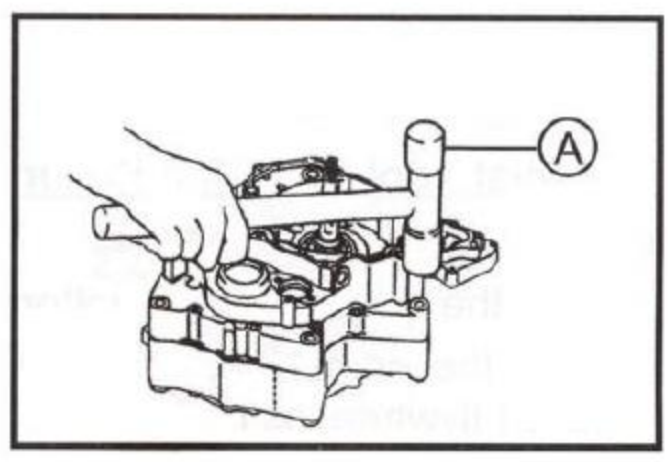
- Remove the crankcase installing jig.

o Check to see that the crankshaft, drive shaft, and out put shaft all turn freely.

★ If the crankshaft will not turn, it is probably not centered. Tap the mount portion of the crankcase with a plastic hammer [A] to reposition it. If it does not free up, split the crankcase again and find the cause.

★ Spinning the output shaft, shift the transmission through all the gears to make certain there is not binding and that all the gears shift properly.

- Clean the cylinder and oil filter cap of the mating surface and wipe off the liquid gasket forced out.
- Install the removed parts.



Crankcase Splitting

Crankshaft Disassembly and Assembly

CAUTION
Since assembly of the crankshaft demands exacting tolerance, the disassembly and reassembly of the crankshaft should only be performed by experienced mechanics with the necessary tools and equipment. The crankpin, connecting rod, and light crankshaft are available separately as spare parts, however it is recommended that the crankshaft assembly be replaced rather than attempting to replace the components.

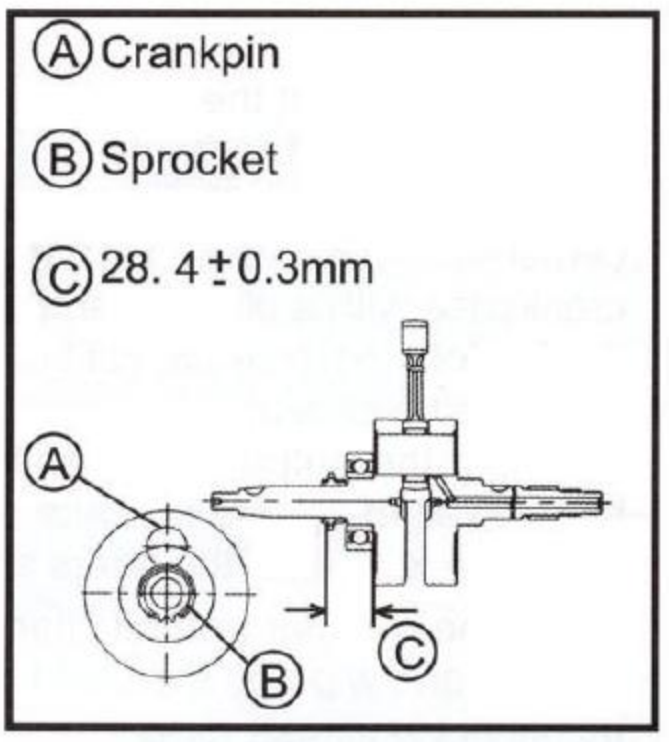
Disassembly

- If it should be necessary to disassemble the crankshaft.
- Remove the camshaft chain drive sprockets and bearing, using the bearing puller if the drive sprocket and bearing remains on the crankshaft.
- Use a press to remove the crankpin.
- Removal of the crankpin separates the flywheels, connecting rod, big end needle bearing, and crankpin.

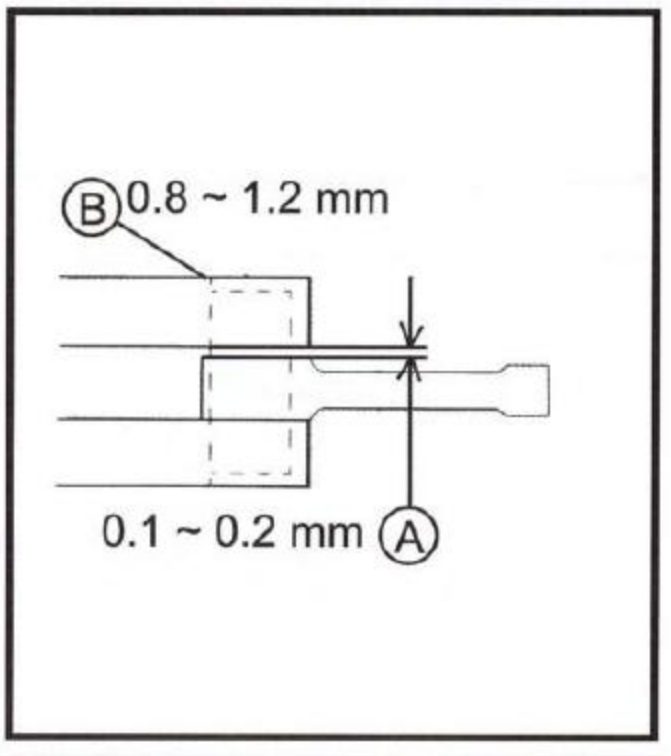
Special Tool - Bearing Puller: 57001-158

Assembly

- Press the bearing until it bottoms out.
- Press the camshaft chain drive sprocket on to the left flywheel as shown.



- Apply engine oil to the big end bearing.
- Press the crank halves onto the crankpin, noting the crankpin direction until connecting rod side clearance is within specification as shown.
  Side Clearance 0.1 ~ 0.2 mm [A]
  Crankpin Depth 0.8 ~ 1.2 mm [B]
- Check the following items after the crankshaft assembly.
  Connecting Rod Radial Clearance
  Connecting Rod Side Clearance
  Crankshaft Runout



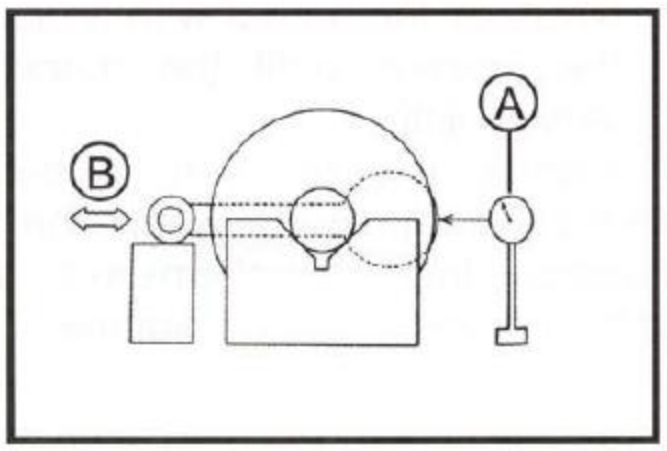
Crankcase Splitting

Connecting Rod Big End Seizure

★ In the case of serious seizure with damaged flywheels, the crankshaft must be replaced.

★ In the case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing, side washers, and connecting rod.

Connecting Rod Big End Radial Clearance

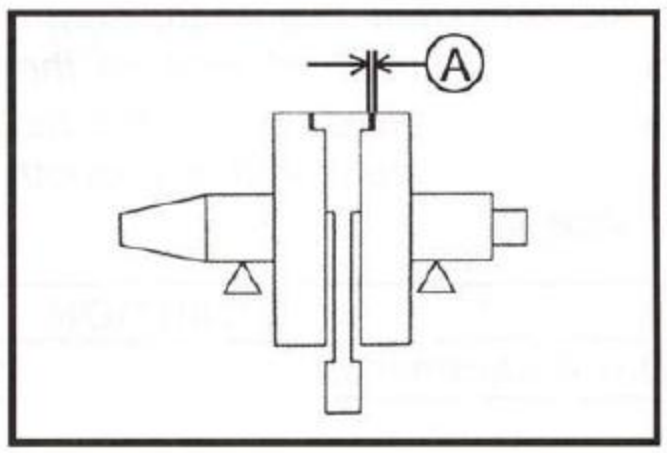


- Set the crankshaft in flywheel alignment jig or on V blocks, and place a dial gauge [A] against the big end of the connecting rod.
- Push [B] the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.

★ If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.

Connecting Rod Big End Radial Clearance
Standard: 0.009 ~ 0.023 mm
Service Limit: 0.07 mm

Connecting Rod Big End Side Clearance

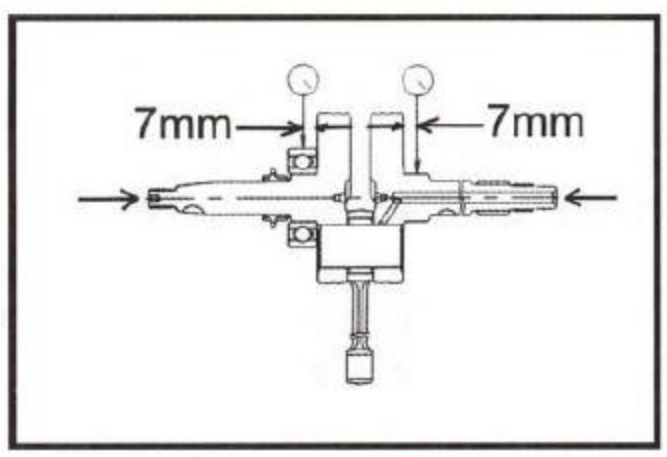


- Measure the side clearance [A] of the connecting rod with a thickness gauge.

★ If the clearance exceeds the service limit, replace the crankshaft.

Connecting Rod Big End Side Clearance
Standard: 0.1 ~ 0.2 mm
Service Limit: 0.4 mm

Crankshaft Runout



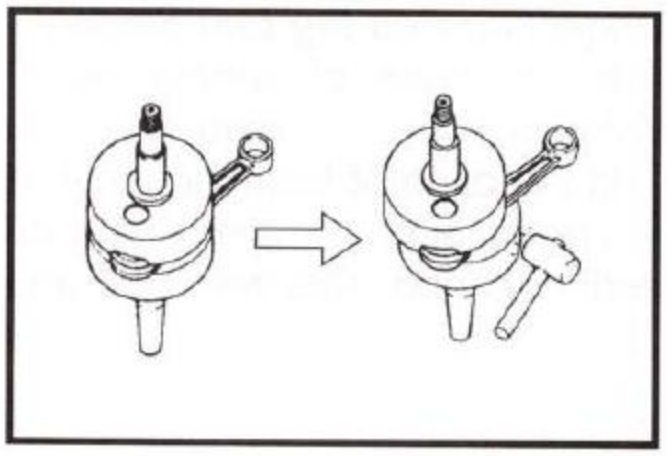
- Set the crankshaft in a flywheel alignment jig or on V blocks, and place dial gauge [A] against the points indicated.
- Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.

Crankshaft Runout
Standard: Less than 0.03 mm TIR
Service Limit: 0.08 mm

Crankcase Splitting

Crankshaft Alignment

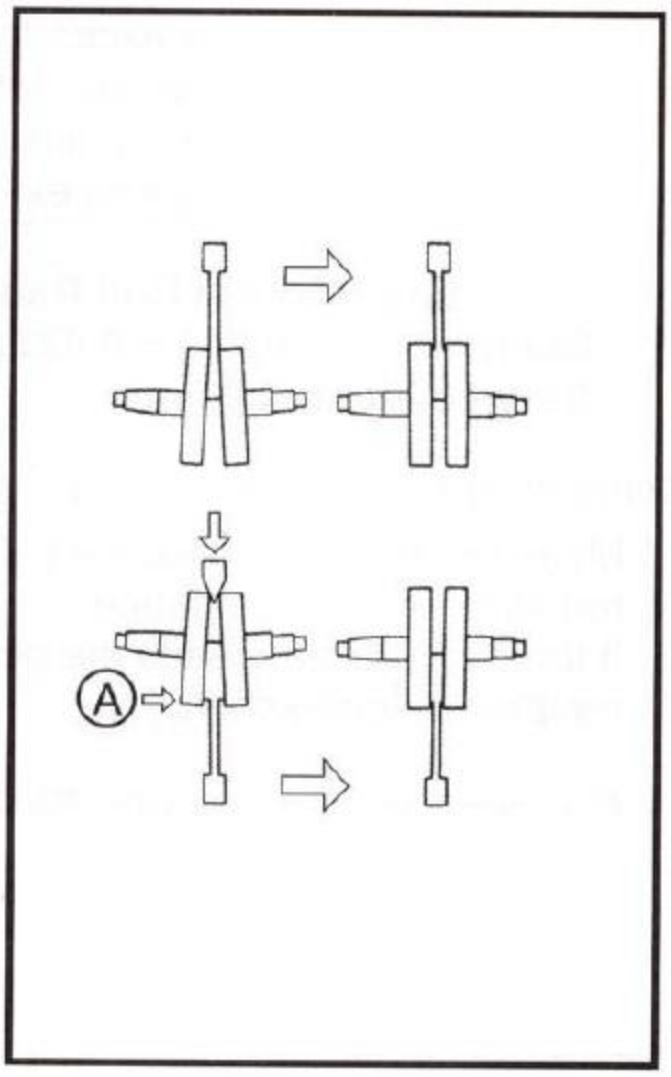
★ If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit.



- In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead, or brass hammer as indicated in the figure.
- Recheck the runout with a dial gauge, repeating the process until the runout falls within the service limit.

o Vertical misalignment is corrected either by driving a wedge in between the flywheels, or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment.

- In the case of both horizontal and vertical misalignment, correct the horizontal misalignment first.
- Recheck big end side clearance after aligning crankshaft (see Connecting Rod Big End Side Clearance).

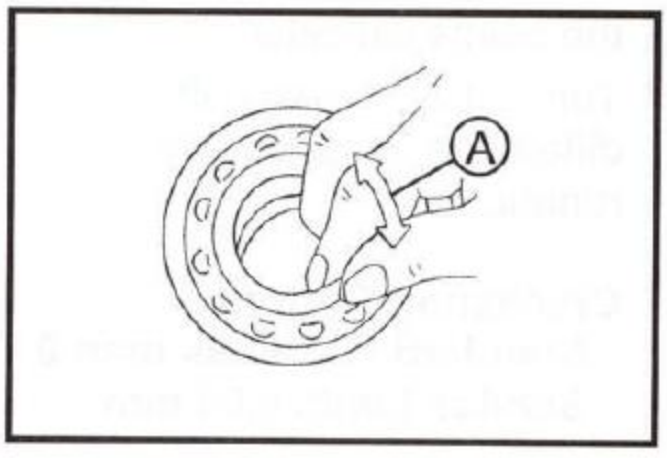


NOTE

o *If crankshaft alignment cannot be corrected by the above method, replace the crankpin or crank halves as required. Recheck the runout and repeat the process until the runout is within service limit.*

CAUTION
Donít hammer the flywheel at the point [A].

Crankshaft Main Bearing Wear

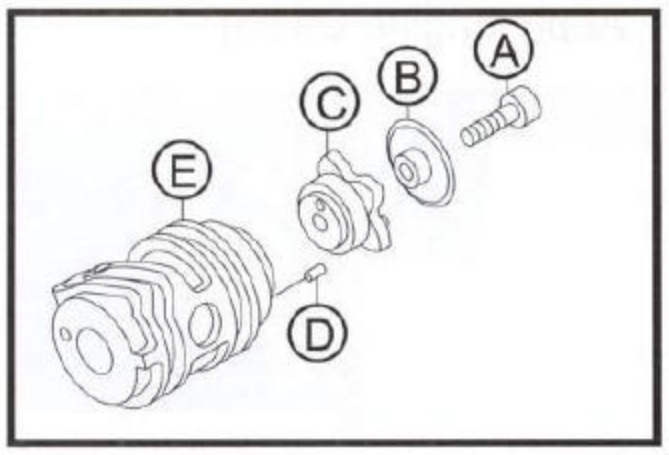


- Wash the bearings in high flash-point solvent, blow them dry (DO NOT SPIN THEM), and lubricate them with engine oil.
- Turn each bearing [A] over by hand and see that it makes no noise, turns smoothly and has no rough spots.

★ If any of the bearings are defective, replace them.

Transmission

Transmission and Shift Mechanism Removal



- Split the crankcase.
- Pull out the shift rods and take out the shift forks.
- Remove the drive and output shaft assemblies as a set.
- Holding the shift drum with suitable bar, unscrew the shift drum Allen bolt [A].
- Remove the cam holder [B], shift drum cam [C] and dowel pin [D].
- Remove the shift drum [E].

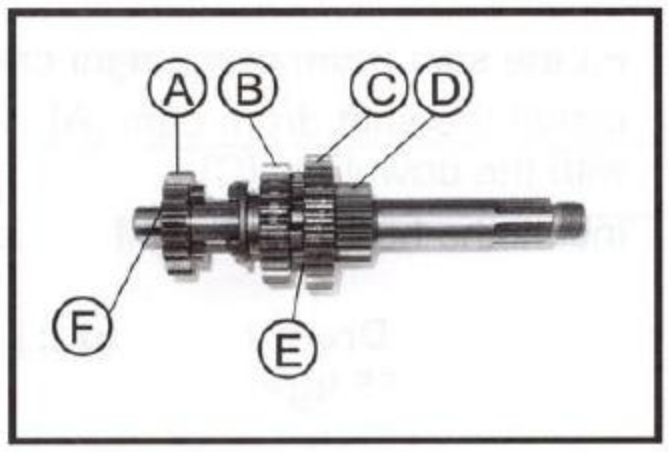
Transmission Disassembly

- Remove the transmission shafts.
- Using the circlip pliers to remove the circlip, disassemble the transmission shaft.

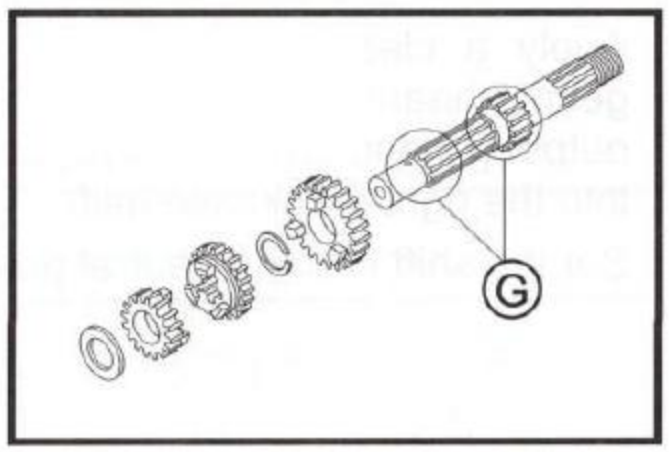
Special Tool - Outside Circlip Pliers:
57001-144

Transmission Assembly

- Assemble the transmission gears as shown.

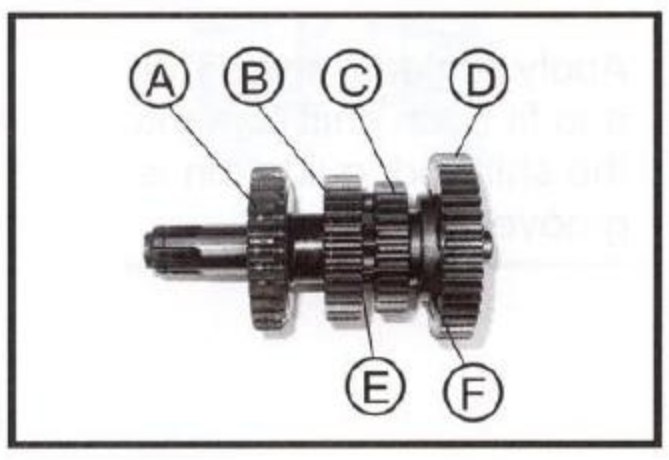


- Replace the old circlip with a new one if it is removed.
- The drive shaft gears can be identified by size, the smallest diameter gear is 1st gear, and the largest 4 th. Be sure that all parts are put back in the correct sequence, facing the proper direction, and that the circlip and the washer are properly in place.



2nd Gear [A]
3rd Gear [B]
4th Geat [C]
1st Gear [D]
Circlip [E]
Shim [F]
Apply Engine Oil [G]

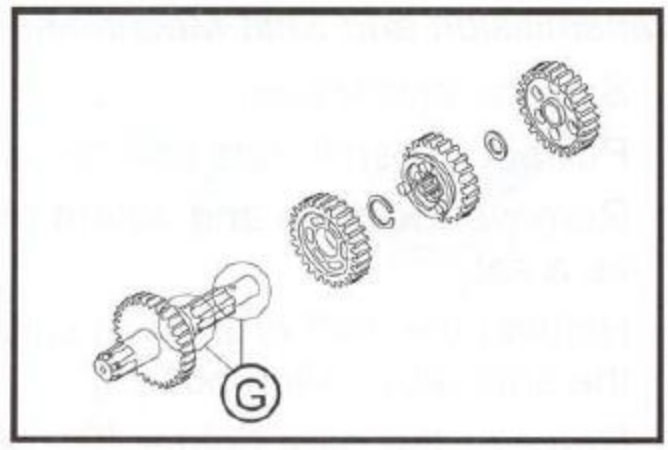
- The output shaft gears can be identified by size; the largest diameter gear is 1 st gear, and the smallest is 4 th. Be sure that all parts are put back in the correct sequence and facing the proper direction, and that the circlip is properly in place.



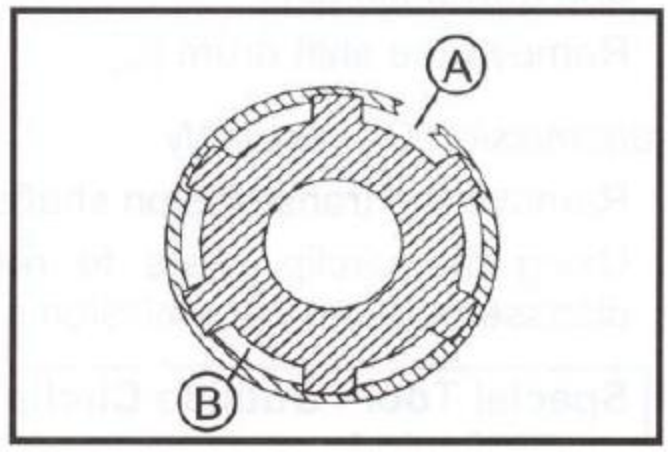
2nd Gear [A]
3rd Gear [B]
4th Gear [C]
1st Gear [D]
Circlip [E]
Spacer [F]

Transmission

Apply Engine Oil [G]

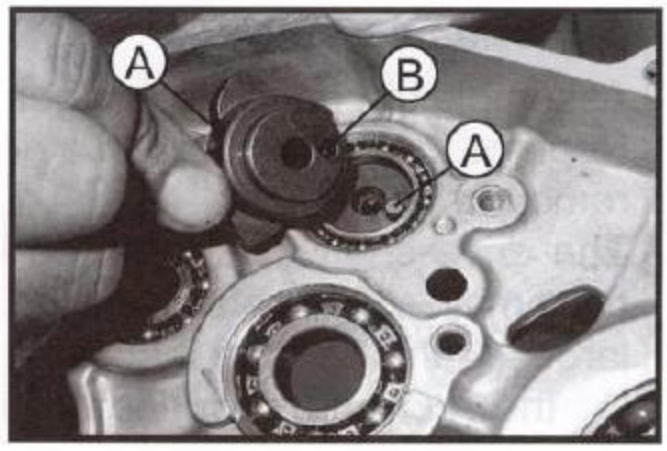


o Always install circlips so that the opening is aligned with a spline groove. To install a circlip without damage, first fit the circlip onto the shaft expanding it just enough to install it, and then use a suitable gear to push the circlip into place.
  [A] Opening of Circlip
  [B] Groove of Shaft Spline



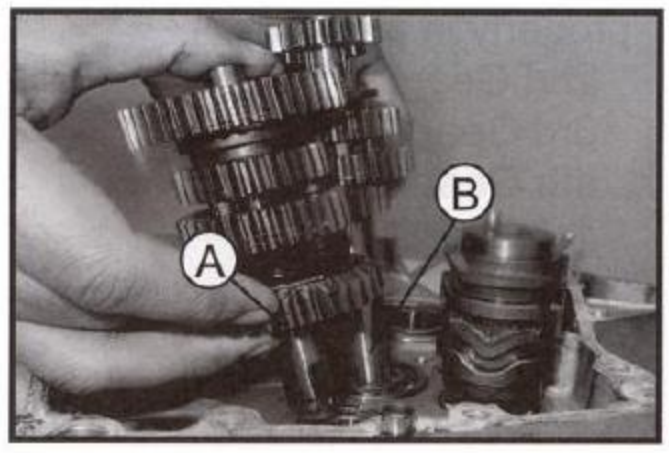
Transmission and Shift Mechanism Installation

- Fit the shift drum to the right crankcase half.
- Install the shift drum cam [A] aligning its hole [B] with the dowel pin [C].
- Install the holder and tighten the Allen bolt.



Torque - Shift Drum Allen Bolt:
5.4 N-m (0.55 kg-m, 48 in-lb)

- Apply a clean engine oil to the transmission gears, bearings, and shaft journal and fit the output [A] and drive shaft [B] assemblies as a set into the right crankcase half.
- Set the shift drum in neutral position.

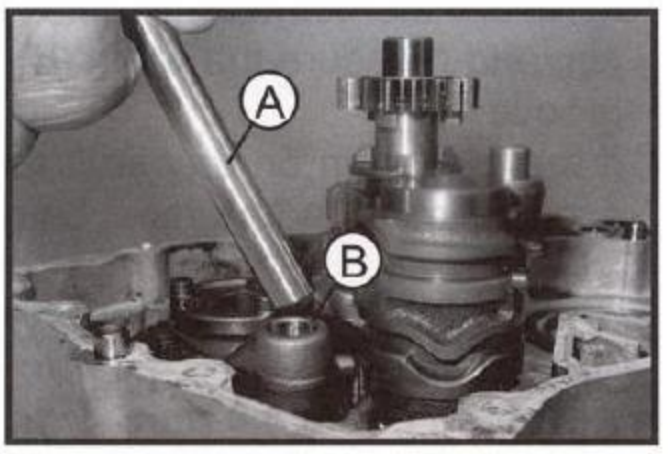


- Apply a clean engine oil to the shift fork fingers and fit each shift fork into its gear-groove so that the shift fork guide pin is in the proper shift drum groove.

Transmission

NOTE

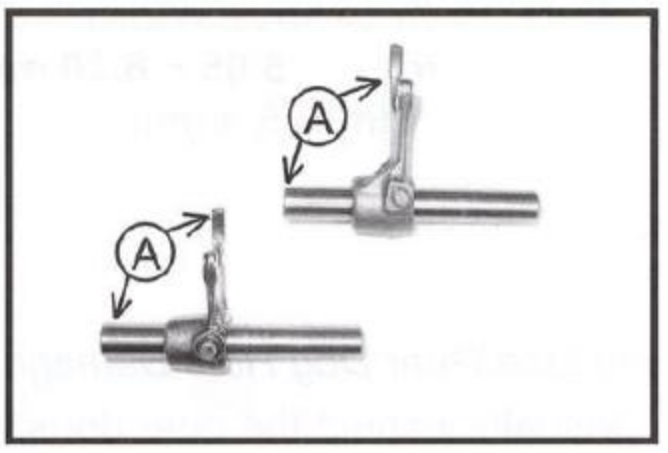
o *Fingers of the 1 st/3rd shift fork are longer than the fingers of the 2 nd/4th shift fork.*



- Apply a clean engine oil to the shift rods [A], and insert each rod running it through each shift fork [B].
- Set the shift drum in neutral position, that is, drive and output shaft turn freely.
- Assemble the crankcase.

Shift Fork Bending

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
  [A] 90°

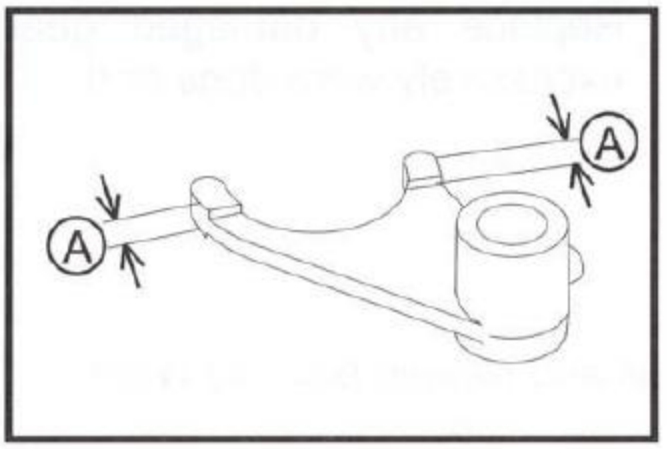


Shift Fork Ear/Gear Shift Fork Groove Wear

- Measure the thickness [A] of the shift fork ears.

★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

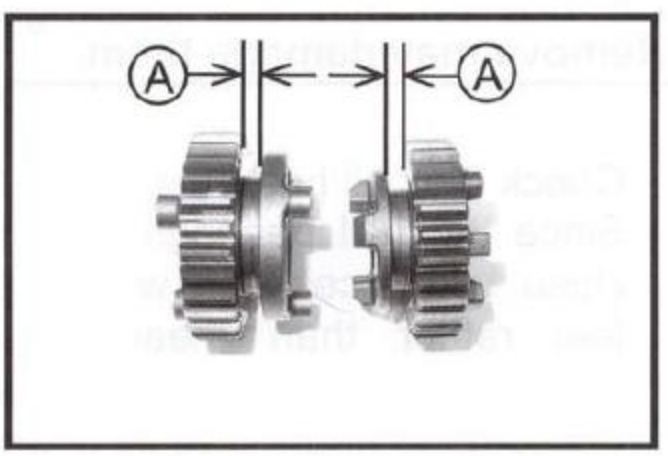
Shift Fork Ear Thickness
Standard: 3.9 ~ 4.0 mm
Service Limit: 3.8 mm



- Measure the width [A] of the gear shift fork grooves in the transmission gears.

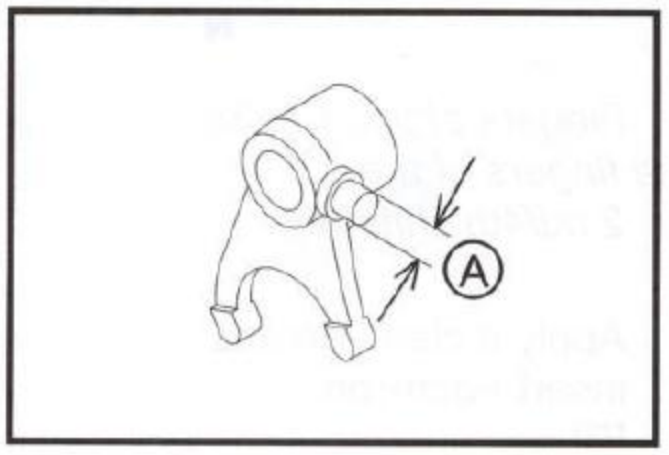
★ If a gear shift fork groove is worn over the service limit, the gear must be replaced.

Gear Shift Fork Groove Width
Standard: 4.05 ~ 4.15 mm
Service Limit: 4.3 mm



Transmission

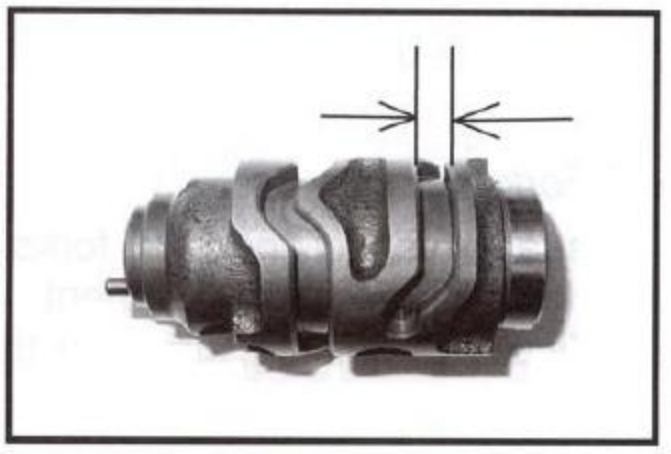
Shift Fork Guide Pin/Shift Drum Groove Wear



- Measure the diameter [A] of each shift fork guide pin, and measure the width [B] of each shift drum groove.

★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

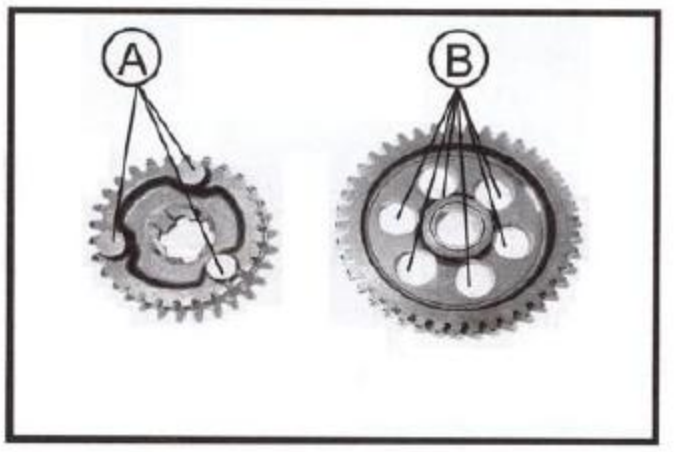
Shift Fork Guide Pin Diameter
Standard: 4.9 ~ 5.0 mm
Service Limit: 4.8 mm



★ If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width
Standard: 5.05 ~ 5.20 mm
Service Limit: 5.3 mm

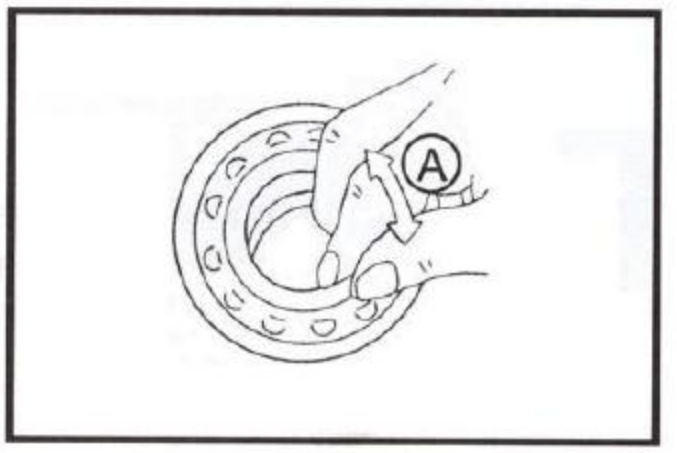
Gear Dog/Gear Dog Hole Damage



- Visually inspect the gear dogs [A] and gear dog holes [B].

★ Replace any damaged gears or gears with excessively worn dogs or dog holes.

Ball and Needle Bearing Wear



CAUTION
Do not remove the bearings for inspection. Remove may damage them.

- Check the ball bearings.

o Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry). and oil it with engine oil.

o Spin [A] a bearings by hand to check its condition.

★ If the bearings are noisy, do not spin smoothly, or have any rough spots, replace them.

- Check the needle bearing.

Transmission

- o The rollers in a needle bearing normally wear very little, and wear is difficult to measure.
- • Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★ If it is any doubt as to the condition of a needle bearing, replace it.

Oil Seal Inspection

- • Inspect the oil seals.
- ★ Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

Wheel/Tires

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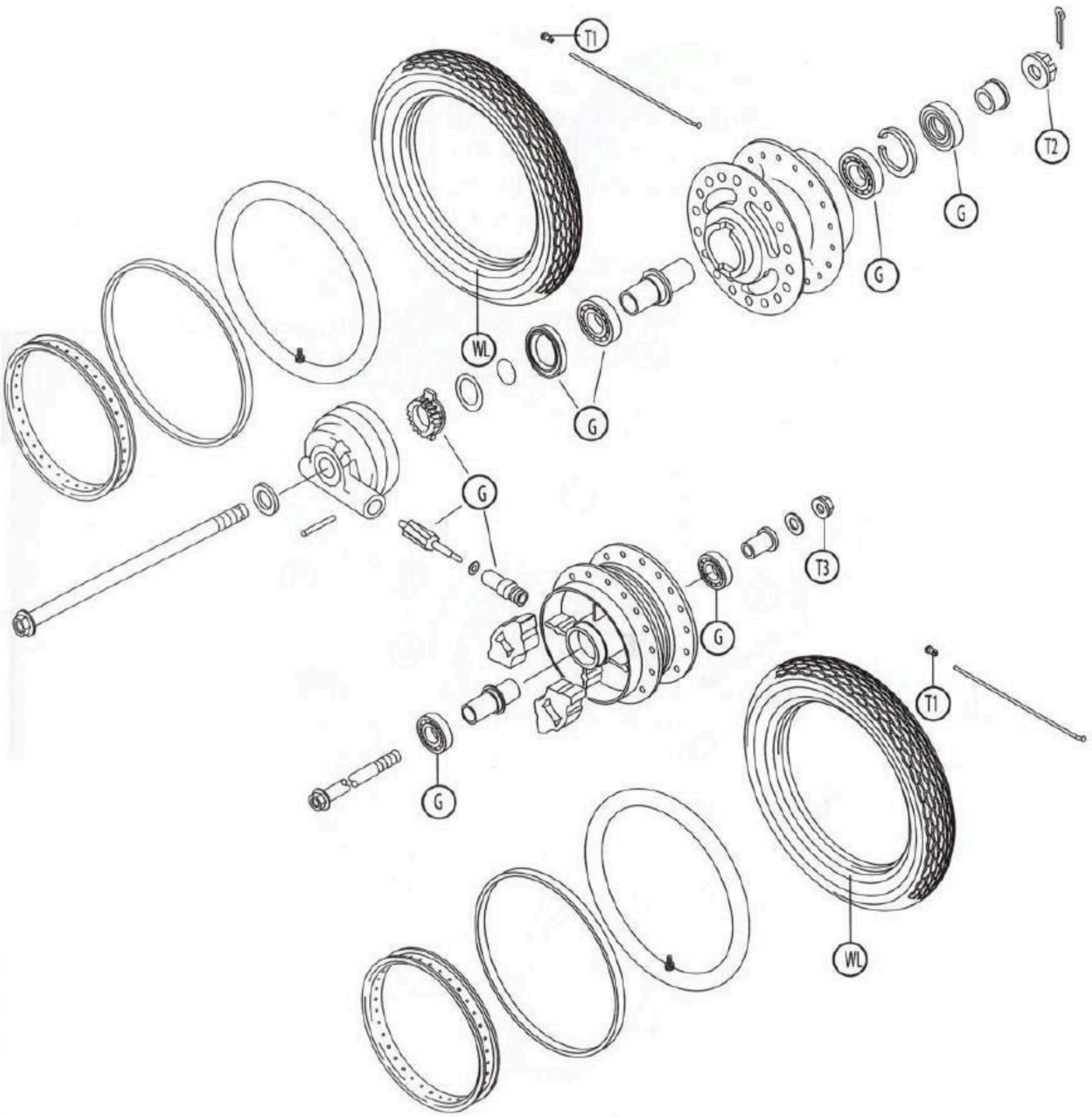
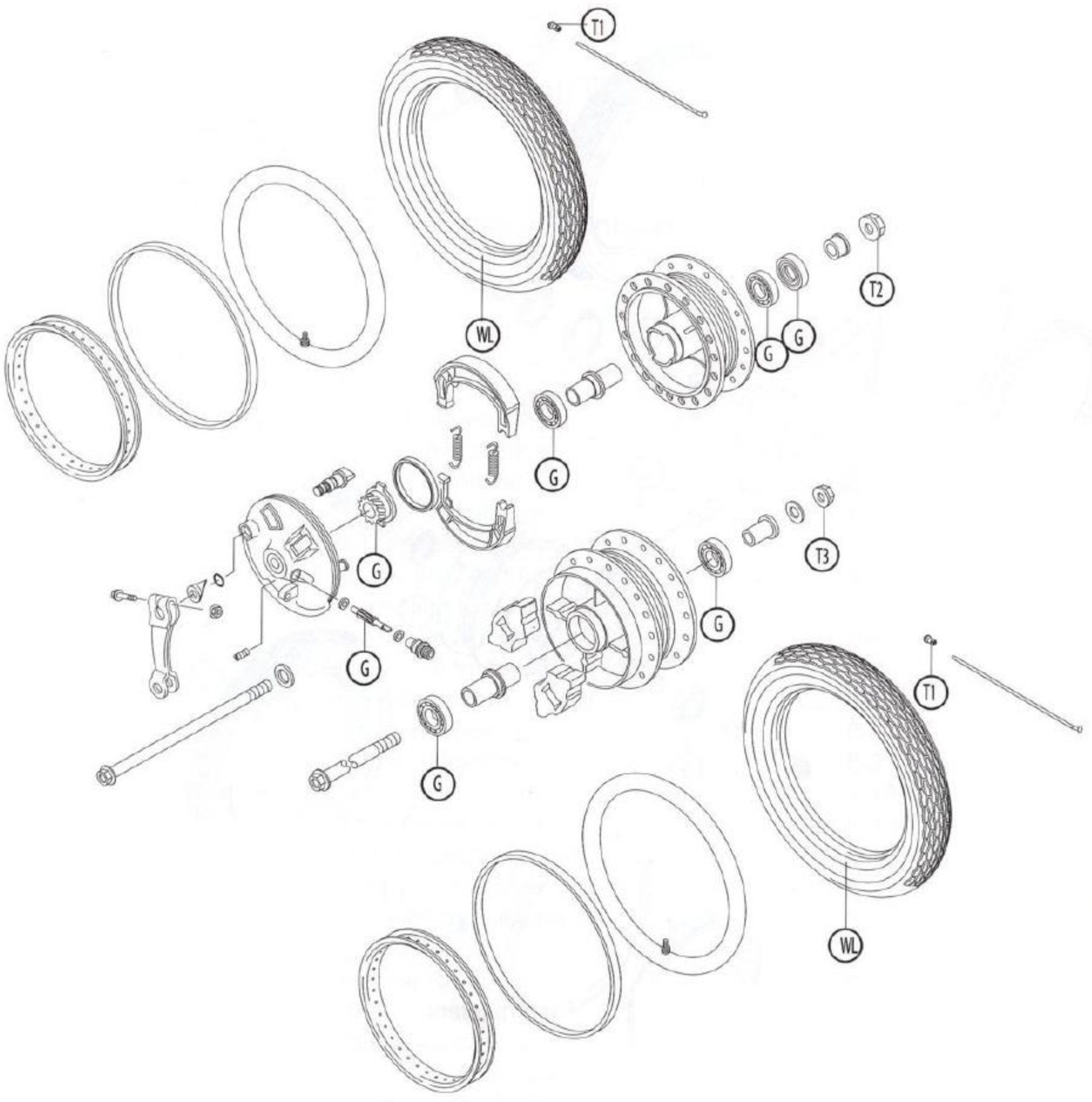
Exploded View



G: Apply grease.
WL: Apply soap and water solution.
T1: 1.5 ~ 2.1 N-m (0.15 ~ 0.21 kg-m, 13 ~ 18 in-lb)
T2: 49 N-m (5.0 kg-m, 36 ft-lb)
T3: 74 N-m (7.5 kg-m, 54 ft-lb)

Exploded View



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T2: 49 N-m (5.0 kg-m, 36 ft-lb)
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Specifications

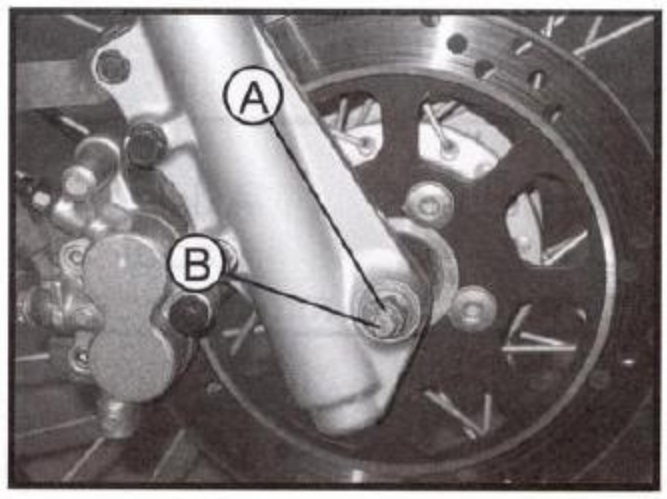
Item		Standard	Service Limit
Wheels:			
Rim runout:	Axial	0.5 mm or less	2 mm
	Radial	0.8 mm or less	2 mm
Axle runout/100 mm		0.1 mm	0.2 mm
Tires:			
Standard tire:	Front	Sime Tires 38L F20 Tube type 2.50-17	---
	Rear	Sime Tires 41P K30 Tube type 2.75-17	---
Tire air pressure:	Front	175 kPa (1.75 kg/cm^2, 25 psi)	---
	Rear	200 kPa (2.00kg/cm^2, 28 psi)	---
Tread depth:	Front	4.5 mm	1 mm
	Rear	5.5 mm	2 mm

Special Tools - Bearing Driver Set: 57001-1129
Bearing Remover Set: 57001-1264

Wheels (Rims)

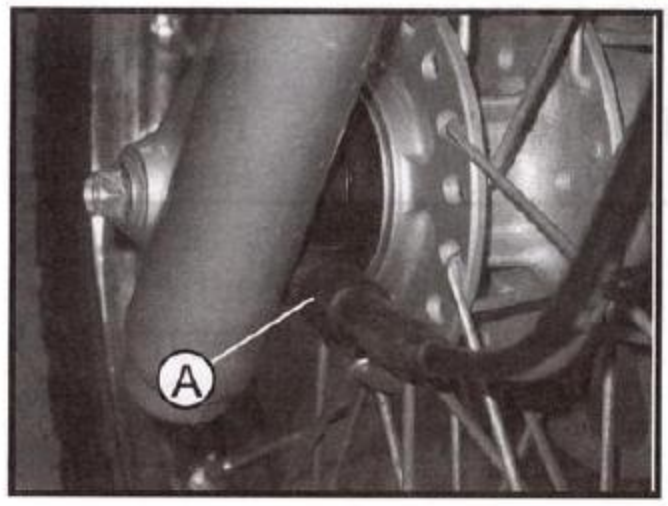
Front Wheel Removal

- Remove:
  Cotter Pin [A]
  Front Axle Nut [B]



- Using a jack, raise the front wheel off the ground.

- Remove speedometer cable end [A]



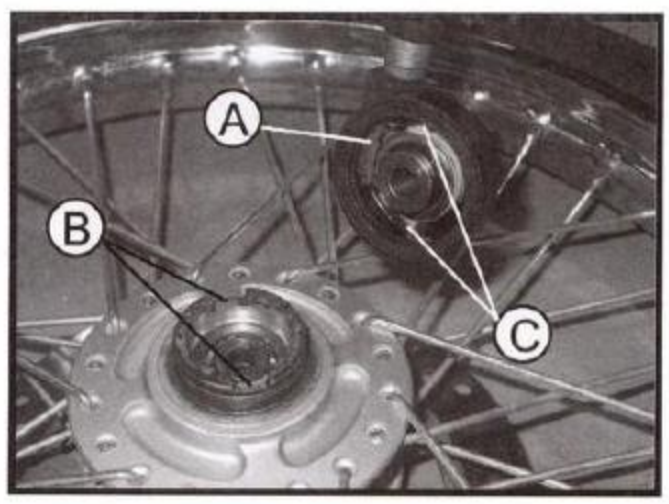
- Pull out the axle and drop the front wheel [A] out of the forks.

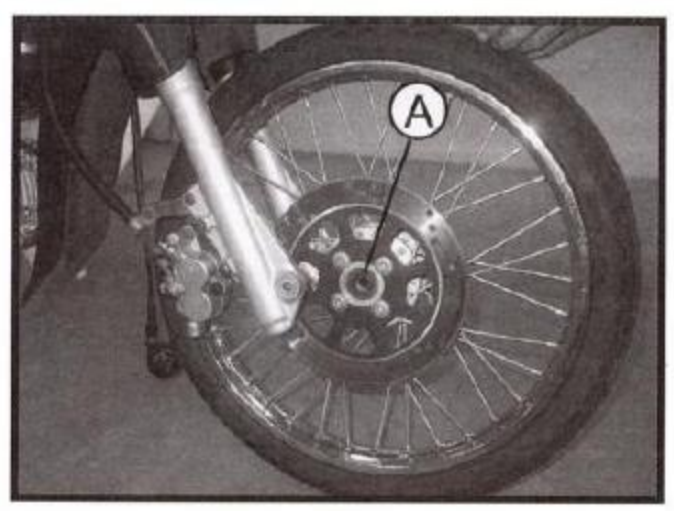
- Insert a wooden plate between the pads in the caliper to prevent the caliper piston from jumping out.

CAUTION
Do not lay the wheel down on the disc. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

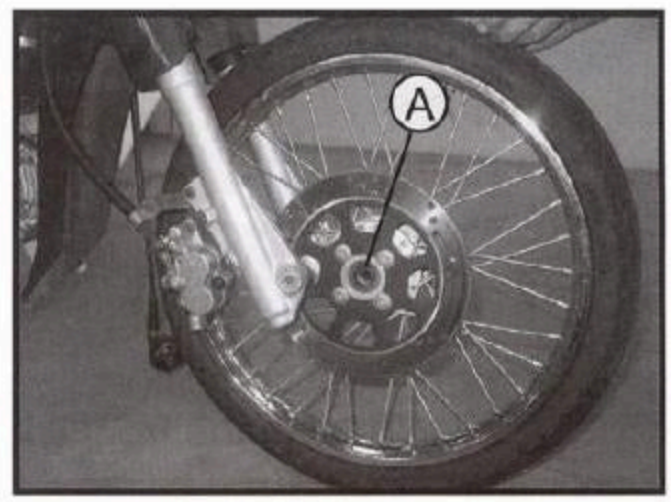
Front Wheel Installation

- Apply grease to the seal lip [A] of the speedometer gear.
- Install the speedometer gear housing so that the projections [C] fit in the drive notches [B].





Wheels (Rims)



- Fit the collar [A] on the right side of the hub.
- Install the front wheel.
- Install the axle from the left side and tighten the axle nut.

Torque - Front Axle Nut: 49 N-m
(5.0 kg-m, 36 ft-lb)

★ Install the cotter pin through the front axle nut to front axle and spread its end.
★ Install speedometer cable lower end.
o Check for brake effectiveness.

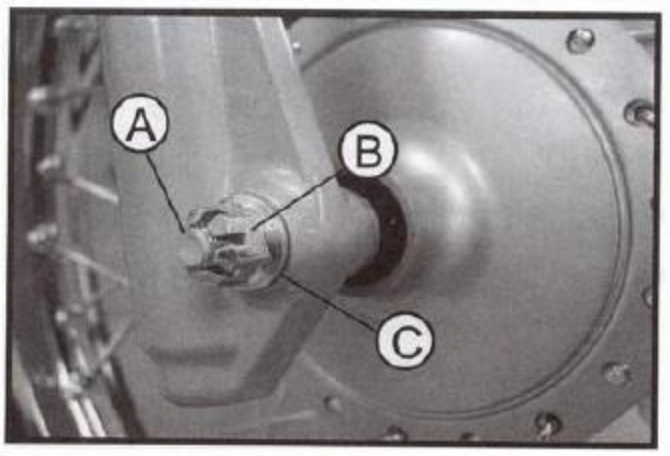
WARNING ⚠

Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

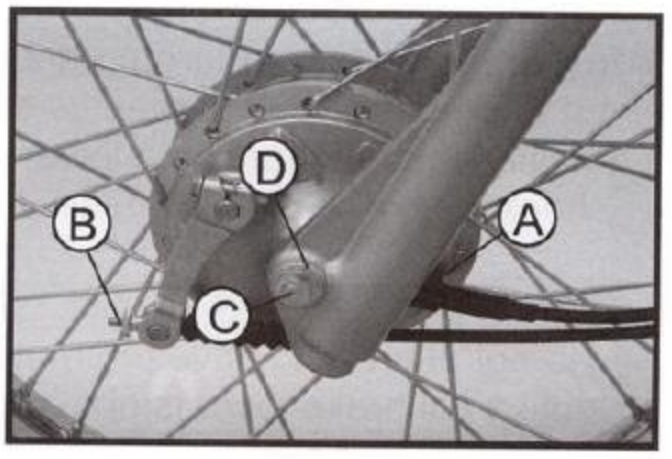
Wheels (Rims)

Front Wheel Removal

- Remove:
  Cotter Pin [A]
  Front Axle Nut [B]
  Washer [C]

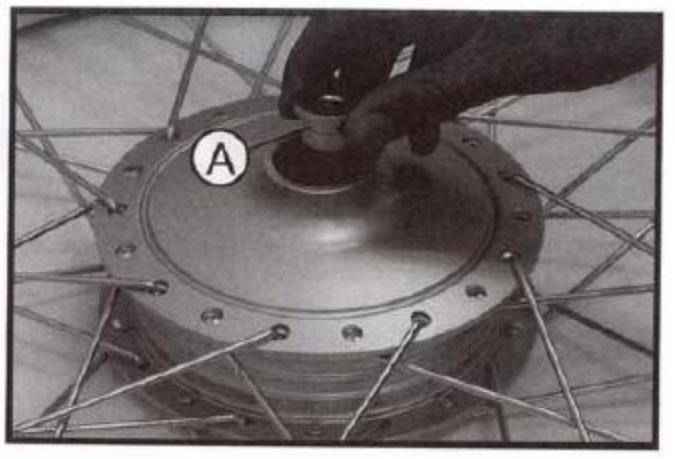


- Using a jack, raise the front wheel off the ground.
- Remove:
  Speedometer Cable End [A]
  Front Brake Cable End [B]
  Front Axle [C]
  Washer [D]
  Front Wheel
  Front Brake Panel

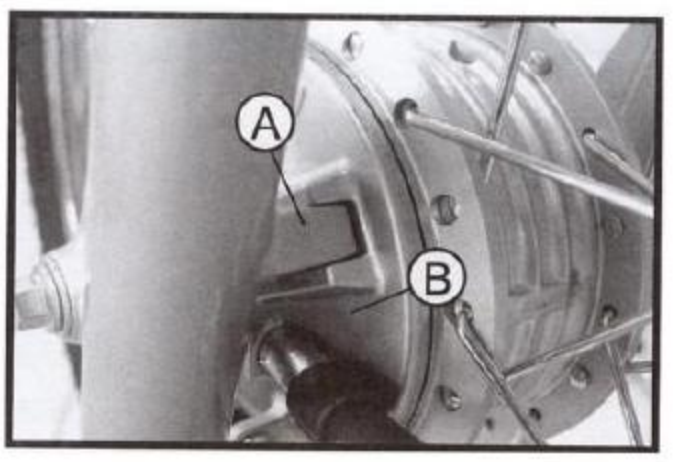


Front Wheel Installation

- Apply high-temperature grease to the grease seal.
- Install the collar [A] on the right side of the hub.



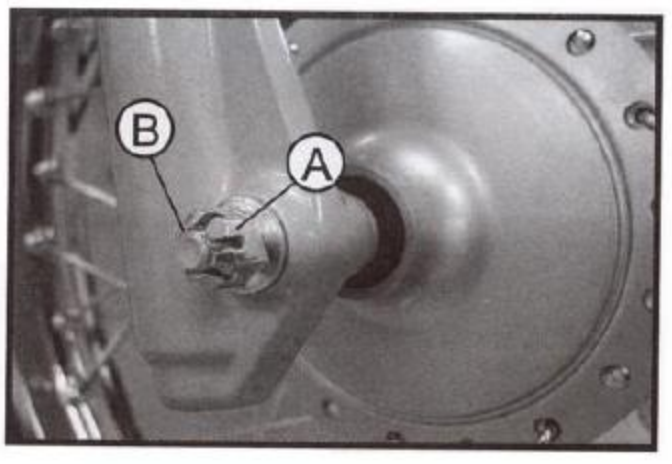
- Fit the tongue [A] on the fork leg into the groove [B] on the front brake panel.



- Tighten the front axle nut [A].

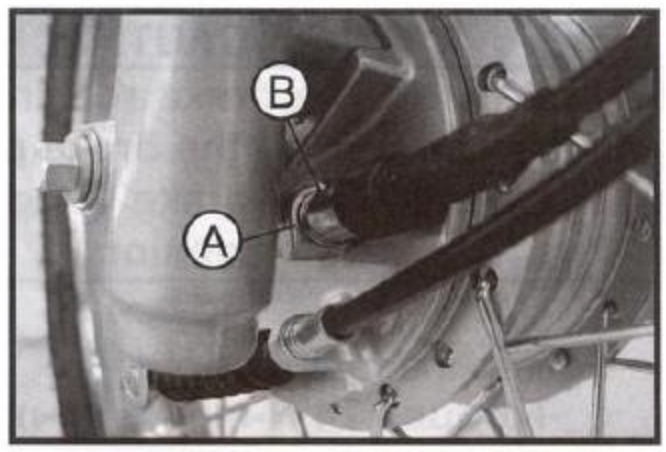
  Torque - Front Axle Nut:
  49 N-m (5.0 kg-m, 36 ft-lb)

- Install the cotter pin [B] through the front axle nut to front axle and spread its ends.



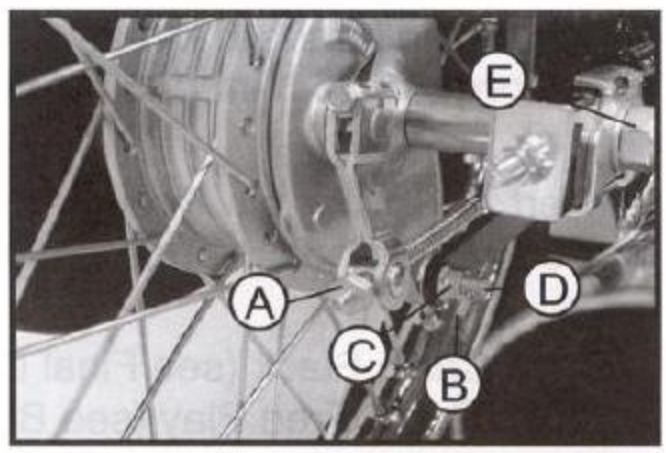
Wheels (Rims)

- Insert the speedometer inner cable into the brake panel while turning the wheel so that the tongue [A] of the speedometer pinion will seat in the slot [B] at the end of the cable. Tighten the cable nut with pliers.
- Install the front brake cable and adjust it (see Brake chapter).



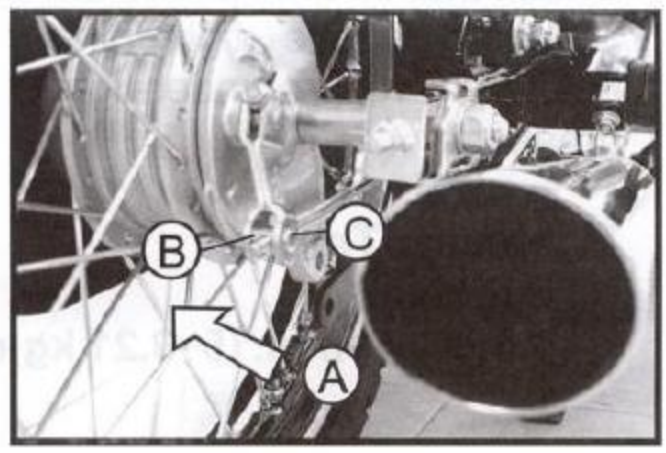
Rear Wheel Removal

- Remove the drive chain.
- Remove:
  Adjusting Nut [A].
  Safety Clip [B].
  Rear Torque Link Nut [C].
  Rear Torque Link Bolt [D].
  Cotter Pin .
  Rear Axle Nut [E].



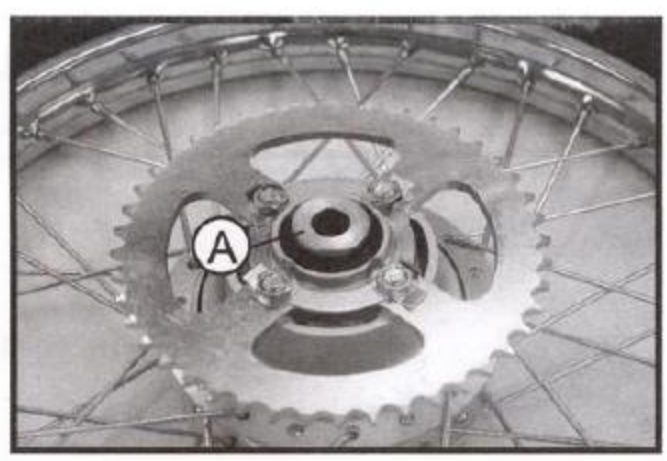
CAUTION

Do not depress the brake pedal deeply with the brake rod inserted into the brake cam lever joint, this may elongate the spring beyond its allowable spring extension.



- To remove the brake rod end from the brake cam lever, first turn the brake panel clockwise [A] as far as it will go, then depress the brake pedal lightly, the brake rod [B] will be separated from the brake cam lever joint [C].
- Pull out the rear axle and remove the rear wheel from the rear wheel coupling and from the motorcycle.

Rear Wheel Installation



- Set the motorcycle up on its center stand.
- Apply high-temperature grease to the grease seal.
- Install the collar on the left [A] and right of the rear hub.
- Install the rear wheel.
- Install the drive chain.
- Adjust the drive chain slack (see Final Drive chapter).
- Turn the brake panel clockwise until the brake cam lever joint goes beyond the brake rod end then insert the brake rod end into the joint hole.

Wheels (Rims)

CAUTION

Do not insert the brake rod into the cam lever joint by depressing the brake pedal deeply, this will extend the brake spring beyond its allowable spring extension.

- Tighten the rear axle nut.
  Torque - 74 N-m (7.5 kg-m, 54 ft-lb)

- Tighten the torque link nut.
  Torque - 25 N-m (2.5 kg-m, 18 ft-lb)

- Insert the cotter pin through the axle nut to rear axle and spread its ends.
- Adjust:
  Drive Chain Slack (see Final Drive chapter)
  Brake Pedal Free Play (see Brakes chapter)

Spoke Tightness Inspection

- Check that all the spokes are tightened evenly.

★ Standard spoke tightening torque is shown below. Over orunder-tightening may cause breakage.

Tightening Torque
Spokes:
1.5~2.1 N-m(0.15~0.21 kg-m, 13~18 in-lb)

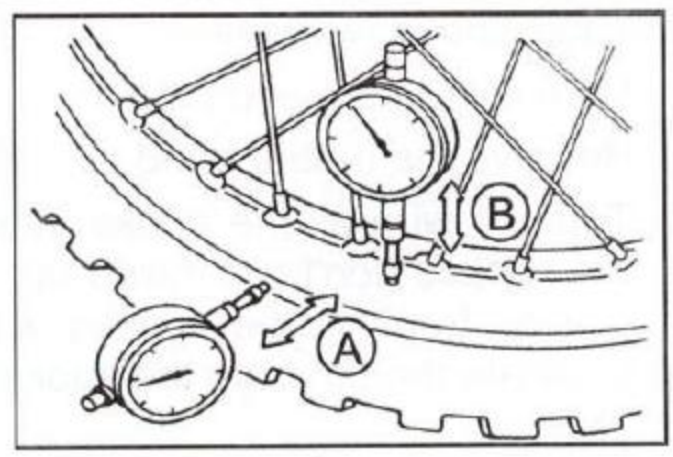
- Check the rim runout.

⚠ WARNING

If any spoke breaks, it should be replaced immediately. A missing spoke places an addi -tional load on the other spokes, which will eventually cause other spokes to break.

Wheels (Rims)

Rim Runout Inspection



- Raise the front /rear wheel off the ground.
- Inspect the rim for small cracks, dents, bending, or warping.

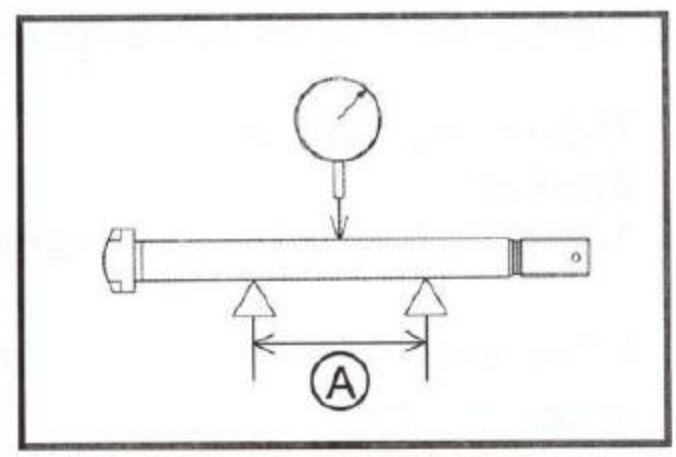
★ If there is any damage to the rim, it must be replaced.

- Set a dial gauge against the side of the rim, and rotate the rim to measure axial runout [A]. The difference between the highest and lowest dial readings is the amount of runout.
- Set a dial gauge to the outer circumference of the rim, and rotate the rim to measure radial runout [B]. The difference between the highest and lowest dial readings is the amount of runout.
- If rim runout exceeds the service limit, check the hub bearing first. Replace them if they are damaged. If the problem is not to the bearings, correct the rim warp (runout). A certain amount of rim warp can be corrected by recentering the rim. Loosen some spokes and tighten others within the standard torque to change the position of different parts of the rim. If the rim is badly bent, however, it should be replaced.

Rim Runout (with tire installed)

	Standard	Service limit
Axial:	**0.5 mm or less**	**2 mm**
Radial:	**0.8 mm or less**	**2 mm**

Axle Inspection



- Visually inspect the front and rear axle for damages.

★ If the axle is damaged or bent, replace it.

- Place the axle in V blocks that are 100 mm [A] apart, and set a dial gauge on the axle at a point halfway between the blocks.
- Turn the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.

★ If runout exceeds the service limit, replace the axle.

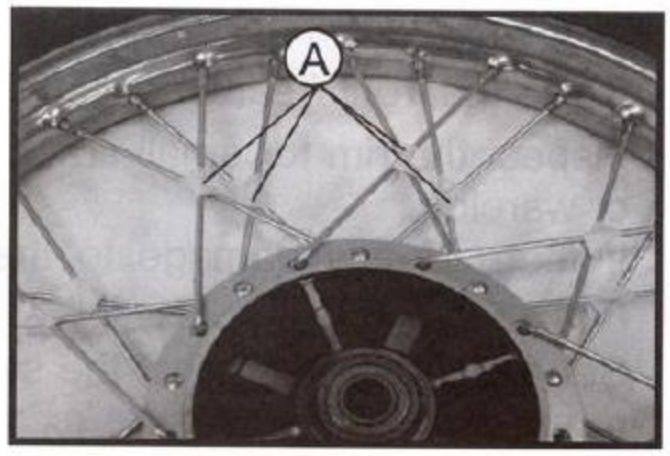
Axle Runout/ 100 mm

Standard:	**0.1 mm**
Service Limit:	**0.2 mm**

Wheels (Rims)

Rim and Spoke Removal

- Remove the tire and tube.
- Remove the rubber band.
- Tape or wire all the spoke intersections so that the spokes don't get mixed up, and unscrew the nipples from all the spokes with a screwdriver; separate the rim from the spokes and hub.
  [A] Tape



Rim and Spokes Installation

- Install the drum at smaller diameter side if the rim has a mark attached.
- Install the drum with a arrow mark rotating direction if it has an arrow mark.
- Tighten the spokes evenly so that the radial (out from the axle) and axial (side to side) runouts are less than the service limit. Make sure that the spokes are tightened evenly within the standard torque range.

  Tightening Torque
  Spokes:
  1.5 ~ 2.1 N-m (0.15 ~ 0.21 kg-m, 13 ~ 18 in-lb)

Spoke Replacement

- Remove the wheel.
- Reduce the tire air pressure by a small amount.
- Insert the new spoke through the hub, and bend it to meet the nipple.
- Tighten the nipples with a spoke wrench.

  Tightening Torque
  Spokes:
  1.5 ~ 2.1 N-m (0.15 ~ 0.21 kg-m, 13 ~ 18 in lb)

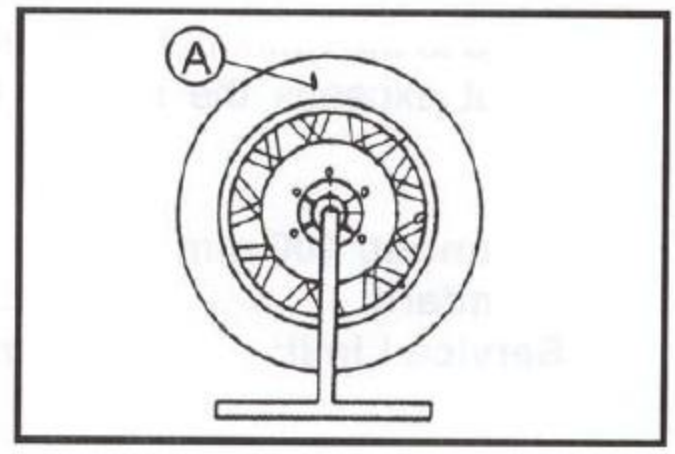
- Inflate the tire to the specified pressure.
- Install the wheel.

Balance Inspection

- Remove the wheel.
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

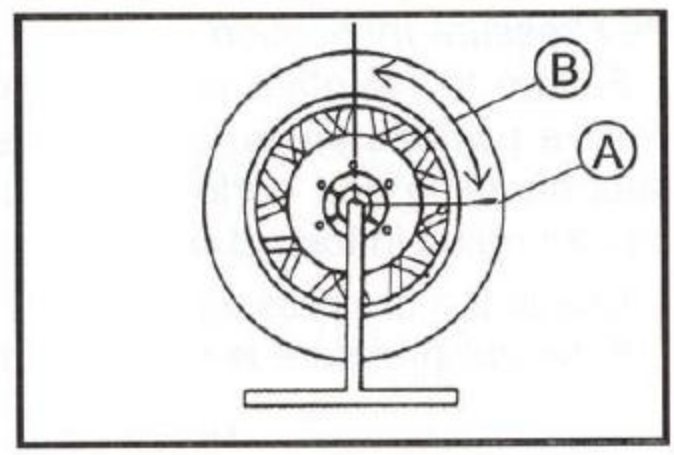
o Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

★ If the wheel always stops in one position, adjust the wheel balance.

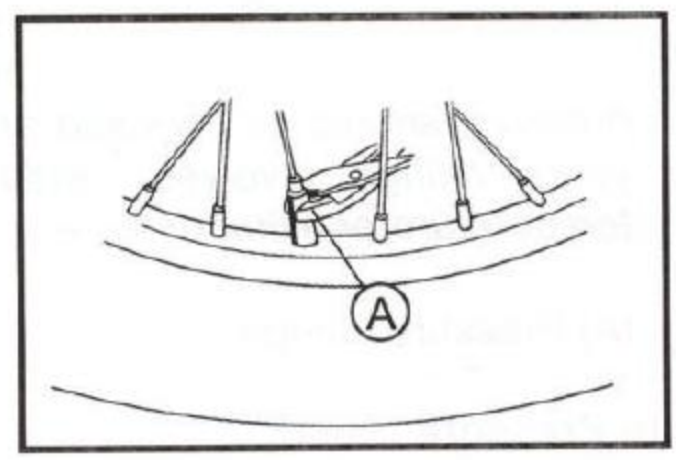


Wheels (Rims)

Balance Adjustment



- If the wheel always stops in one position, provisionally attach a balance weight [A] to the spoke.
  - o Attach a balance weight loosely to the spoke under the marking.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.
  - ★ If the wheel rotates and the weight goes up, replace the weight with the next heavier size.
  - ★ If the wheel rotates and the weight goes down, replace the weight with the next lighter size.
- Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.
- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Install the balance weight firmly to the spoke.
  - o Clamp on the balance weight firmly using pliers [A].



Balance Weight

Part Number	Weight (grams)
41075-1007	10
41075-1008	20
41075-1009	30

Tires

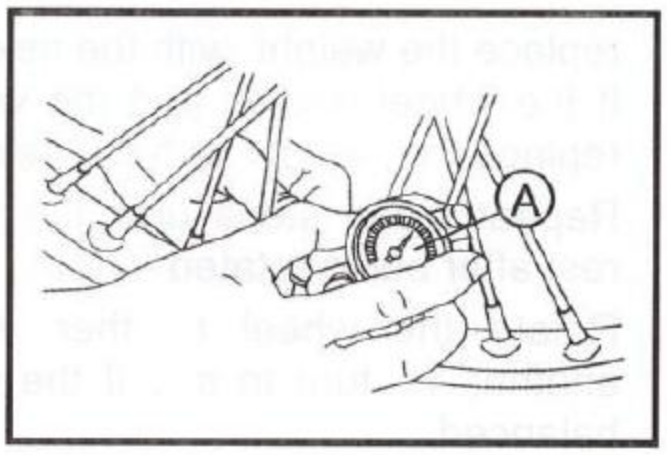
Tire Pressure Inspection

Failure to maintain proper inflation pressures or observe payload limits for your tires may adversely affect handling and performance of your motorcycle and can result in loss of control.

- Check the tire pressure often.
- ★ If the tire pressure is not correct, adjust it.

NOTE

- o *Measure the tire pressure when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).*
- o *Tire pressure is affected by changes in ambient temperature and altitude, and so the tire pressure should be checked and adjusted when your riding involves wide variations in temperature or altitude.*

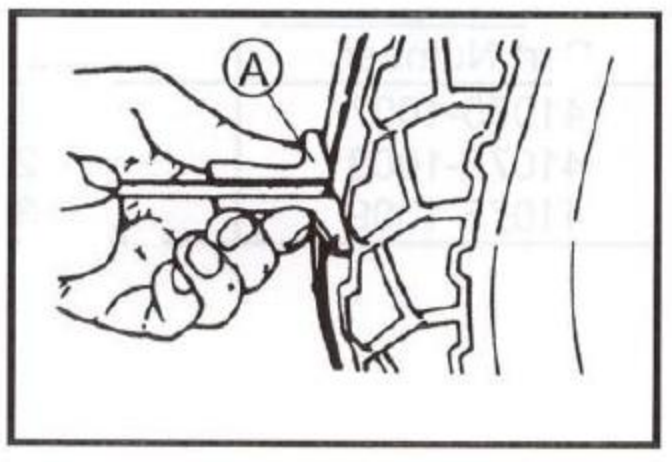


[A] Pressure Gauge

Tire Pressure

Front: 175 kPa (1.75 kg/cm , 25 psi)
Rear: 200 kPa (2.00 kg/cm , 28 psi)

Tire Wear Inspection



- Remove any imbedded stones or other foreign particles from the tread.
- Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage. Swelling or high spots indicate internal damage, requiring tire replacement
- Measure the tread depth at the center of the tread with a depth gauge [A] . Since the tire may wear unevenly , take measurements at several places.
- ★ If any measurement, is less than the service limit, replace the tire.

Tread Depth
Service Limit:

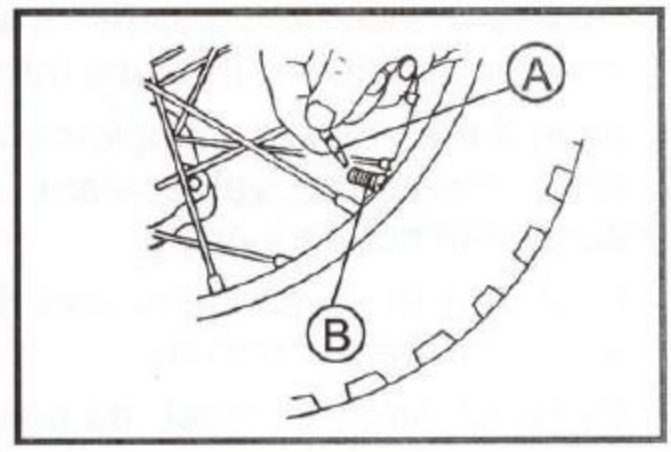
Front	**1 mm**
Rear	**2 mm**

⚠ WARNING

To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Tires

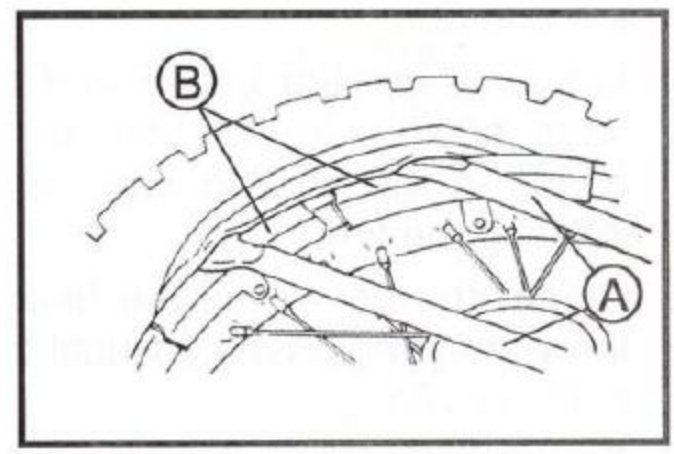
Tire and Tube Removal



- Remove the wheel from the motorcycle.
- Take out the valve core [A] to let out the air, and remove the valve stem nut [B].

- Lubricate the tire beads and rim flanges on both sides with a soap and water solution. This helps the tire beads slip off the rim flanges.

CAUTION
Never lubricate with mineral oil (engine oil) or gasoline because they will cause deterioration of the tire.



- Break the beads away from both sides of the rim.
- Lubricate the tire irons [A] and rim protectors [B] with soap and water solution, or rubber lubricant.
- Step on the side of the tire opposite the valve stem, and pry the tire off the rim with tire iron of the bead breaker protecting the rim with rim protectors.

NOTE

o *For easier removal, always position the tire iron opposite the valve stem in the rim well, and pry the tire bead a little at a time.*

CAUTION
Take care not insert the tire irons so deeply that the tube gets damaged.

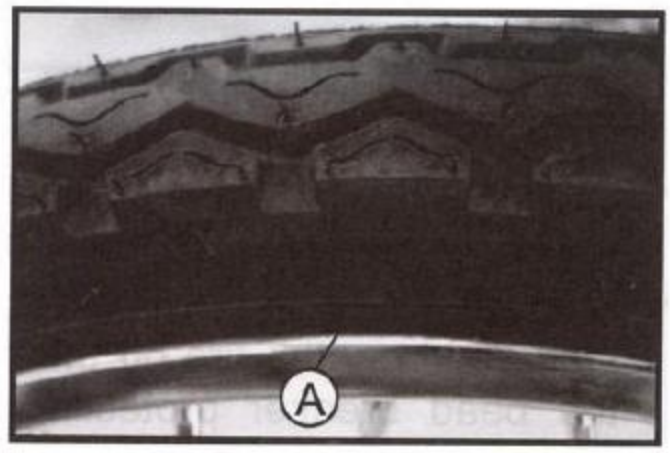
- Remove the tube when one side of the tire is pried off.
- Pry the other side of the tire off the rim, and remove the rim from the tire.

Tire and Tube Installation

- Put just enough air in the tube to keep it from getting caught between the tire and rim. Too much air makes fitting difficult, and too little will make the tube more liable to be pinched by the irons.

Tires

- Dust the tube and inside the tire with talcum powder, and insert the tube into the tire now,
- even if the tire was completely removed from the rim. Insert the valve stem into the rim, and screw the nut on loosely.
- Lubricate the tire beads and rim flanges with a soap and water solution.
- By hand, slide as much as possible of the lower side of the tire bead over the rim flange, starting at the side opposite the valve.
- Use tire irons to install the remaining part of the tire installation, position the part of the bead which is already over the rim flange in the rim well.
- Install the other side of the tire bead onto the rim in the same manner.
- Check that the tube is not pinched between the tire and rim.
- Lubricate the tire beads and rim flanges with a soap and water solution to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the rim flange.



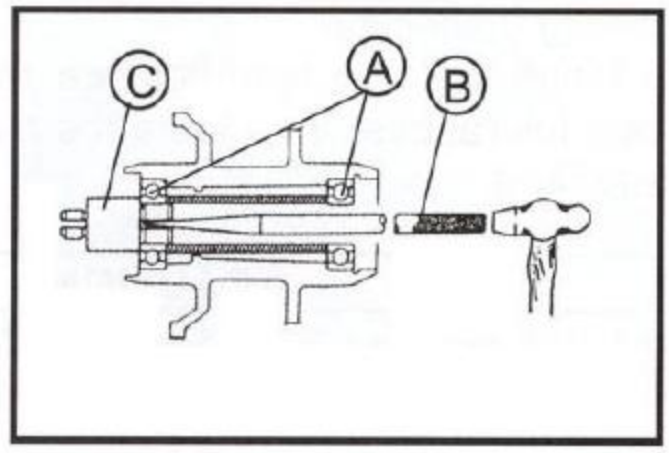
- Check to see that the rim lines on both sides of the tire sidewalls are parallel with the rim flanges.

★ If the rim lines and tire sidewall lines [A] are not parallel, remove the valve core. Lubricate the rim flanges and tire beads. Install the valve core and inflate the tire again.

- Inflate the tire to the specified pressure.
- Install the wheel.

Hub Bearing

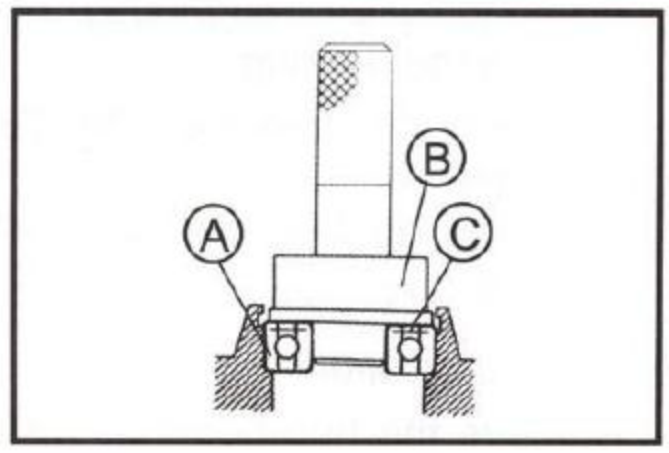
Hub Bearing Removal



- Remove the wheel.
- To remove the grease seals, pry out the grease seal using a screwdriver.
- Using the bearing remover shaft and bearing remover head, remove the hub bearings [A].

Special Tool - Bearing Remover Shaft, ϕ9: 57001-1265 [B]
Bearing Remover Head, ϕ10 x ϕ12: 57001-1266[C]

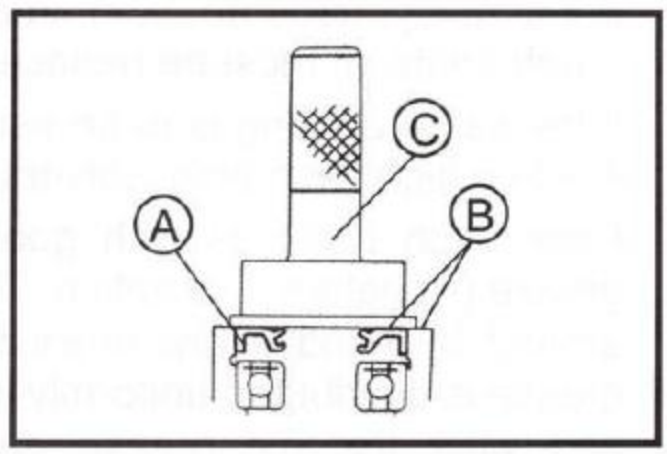
Hub Bearing Installation



- Before installing the hub bearings, blow any dirt or foreign particles out the hub with compressed air to prevent contamination of the bearings.
- Inspect the bearings and replace them if necessary.
- Install the bearings [A] using the bearing driver set [B] so that the marked or shield sides [C] face out.
- Press in the bearings until they bottom out.

Special Tool - Bearing Driver Set: 57001-1129

NOTE

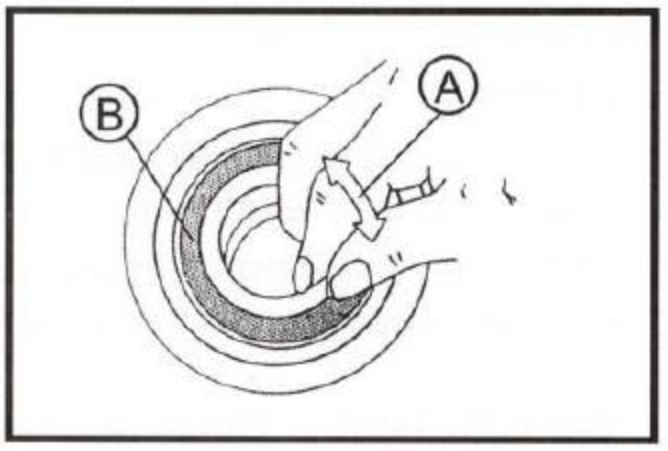


- *For correct tire alignment, the right bearing must be installed first rather than left bearing in both front and rear hubs.*
- Inspect the grease seal [A] and replace if necessary.
- Apply high-temperature grease to the grease seal lips.
- Press in the grease seal so that the seal surface [B] is flush with the end of the hole [C].

Hub Bearing

Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance cannot normally be measured.



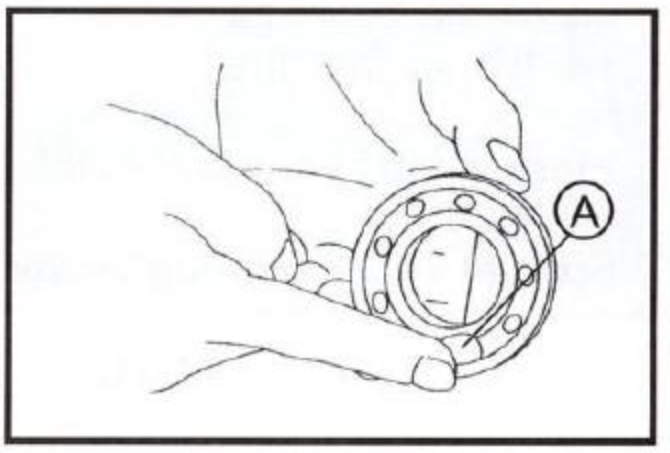
CAUTION

Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding. If bearing play, roughness, or binding is found, replace the bearing.
- Examine the bearing seal [B] for damage or leakage.

★ If the seal is damaged or is leaking, replace the bearing.

Bearing Lubrication



- Remove the hub bearings on the front and rear wheel hubs.
- Wash the bearings with a high flash - point solvent , dry them (do not spin them while they are dry) ,and oil them.
- Spin each bearings by hand to check its condition.

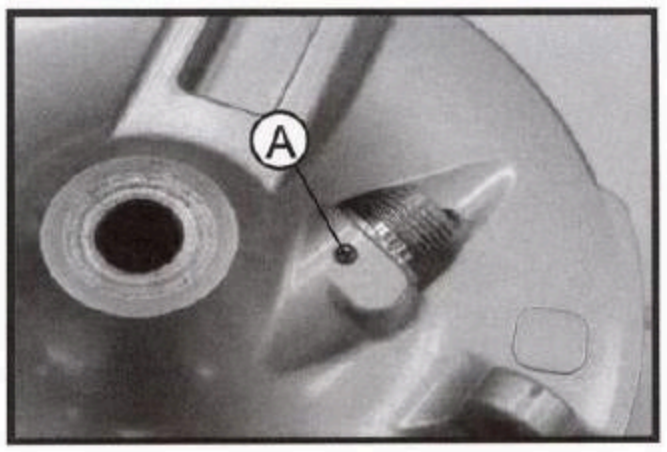
★ If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

- If the same bearing is to be used again, re-wash it with a high flash-point solvent, and dry it.
- Pack each bearings with good quality bearing grease [A] before installation. Turn each bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing and wipe the old grease out of the bearing housings on the wheel hub before bearing installation.
- Install the bearings.

Speedometer Gear and Pinion

Speedometer Gear and Pinion Removal

- Remove the brake penal and pull off the speedometer gear.
- Unscrew the stopper screw [A] and pull out the speedometer cable bushing, thrust washer, pinion and thrust washer.



Speedometer Gear and Pinion Installation

- Lubricate the speedometer gear and pinion.
- Replace the grease seal with a new one if it was removed. Apply a little grease to the seal and drive it using bearing driver set.

  Special Tool - Bearing Driver Set: 57001-1129

- If the speedometer pinion was removed, install the pinion securely.

Final Drive

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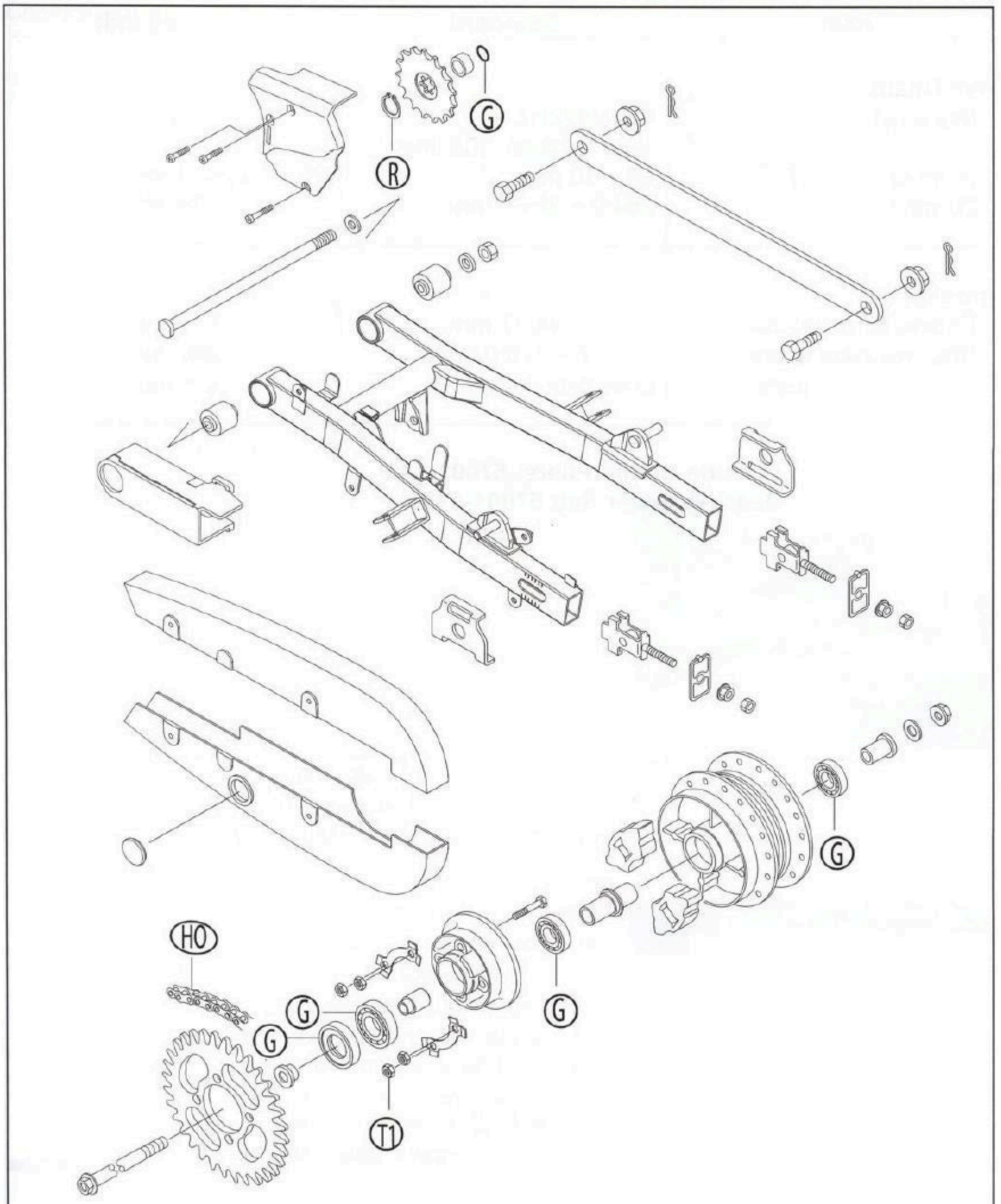
Exploded View



G: Apply grease.
HO: Apply heavy oil
R: Replacement Parts
T1: 26 N-m (2.7 kg-m, 19.5 ft-lb)

9-3 FINAL DRIVE

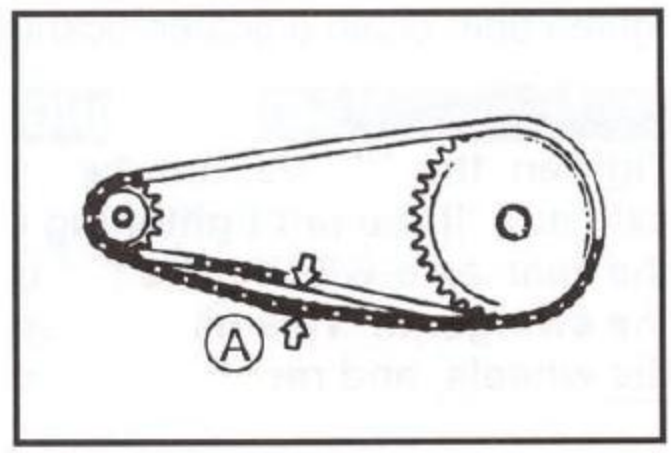
Specifications

Item	Standard	Service Limit
Drive Chain:		
Make/type	RK-M428HZ Joint endless, 108 links	---
Drive chain slack	20 ~ 30 mm	20 ~ 35 mm Usable Range
20 link length	254.0 ~ 254.6 mm	259 mm
Sprocket:		
Engine sprocket diameter	43.97 ~ 44.17 mm	43.4 mm
Rear sprocket diameter	169.57 ~ 170.07 mm	169.3 mm
Rear sprocket warp	Less than 0.4 mm	0.5 mm

Special Tools - Outside Circlip Pliers: 57001-144
Bearing Driver Set: 57001-1129

Drive Chain

Chain Slack Inspection



NOTE

o *Check the slack with the motorcycle setting on its center stand.*

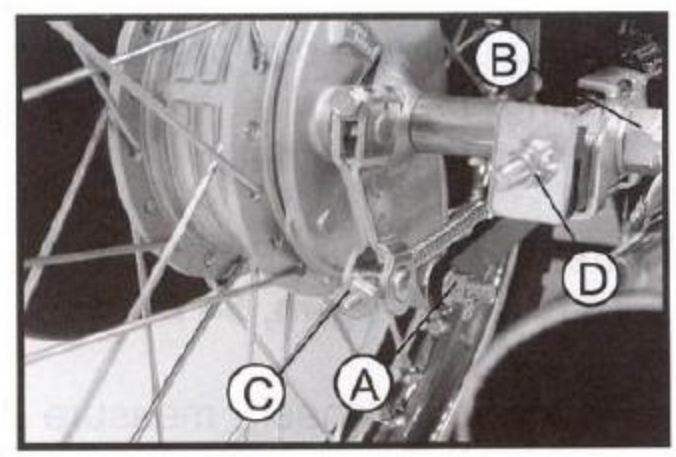
o *Clean the chain if it is dirty, and lubricate it if it appears dry.*

- Rotate the rear wheel to find the position where the chain is tightest, and measure the vertical movement.

★ If the drive chain slack [A] is out of the usable range, adjust it so that the chain slack will be within the standard value.

Drive Chain Slack
Standard: 20 ~ 30 mm
Usable Range: 20 ~ 35 mm

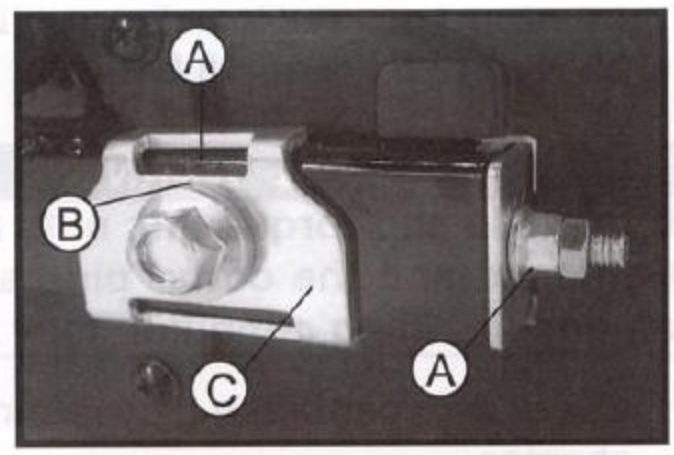
Chain Slack Adjustment



- Remove:
  Cotter Pin
- Loosen:
  Rear Torque Link Nut [A]
  Axle Nut [B]
  Brake Adjuster [C]
  Right and Left Chain Adjuster Locknuts [D]

CAUTION

If you donít loosen the torque link nut, it may lead to the brake parts damage when the adjusters are set.



- If the chain is too tight, back out the left and right chain adjusting nuts [A] evenly, and kick the wheel forward until the chain is too loose.
- Turn both chains adjusting nuts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [B] on the left chain adjuster [C] should align with the same swing arm mark [D] that the right chain adjuster notch aligns with.

NOTE

o *Wheel alignment can also be checked using the straightedge or string method.*

⚠ WARNING

Misalignment of the wheel will result in abnormal wear, and may result in an unsafe riding condition.

Drive Chain

Tighten both chain adjuster locknuts.

⚠ WARNING

Tighten the sleeve nut before tightening the axle nut. If the nut tightening order is reversed, the rear axle will not be securely mounted on the swingarm. This may cause misalignment of the wheels, and result in loss of control.

- Center the brake panel assembly in the brake drum. This is done by tightening the axle nut lightly, spinning the wheel, and depress the brake pedal forcefully. The partially tightened axle nut allows the brake panel assembly to center itself within the brake drum.

NOTE

- *This procedure can prevent a soft, or "spongy feeling" brake.*
- Tighten the axle nut.

Tightening Torque- Rear Axle Nut:
74 N-m (7.5 kg-m, 54 ft-lb)

- Rotate the wheel, measure the chain slacks again at the tightest position, and readjust if necessary.
- Insert a new cotter pin and spread its ends.
- Tighten the rear torque link nut securely.

Tightening Torque-Rear Torque Link Nut:
25 N-m (2.5 kg-m, 18.0 ft-lb)

⚠ WARNING

If the axle and torque link nuts are not securely tightened and the cotter pins are not installed, an unsafe riding condition may result.

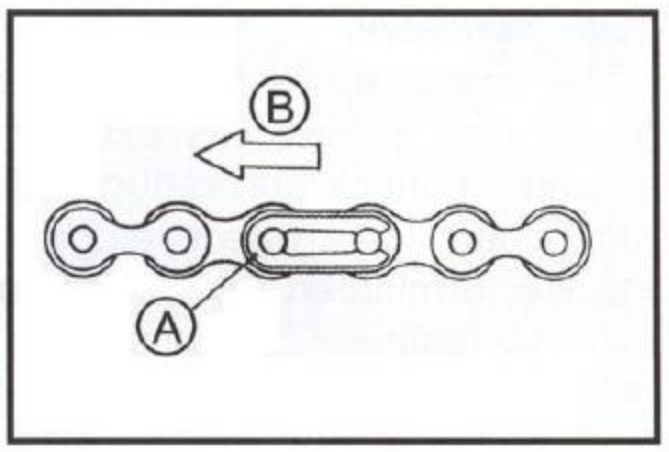
- Check the rear brake play referring to brake chapter.

Drive Chain Removal

- Remove:
  Drive Chain Cover
  Engine Sprocket Cover
- Remove the clip from the drive chain master link using pliers and remove the master link.
- Free the drive chain from the sprocket, being careful that the chain does not get dirty from contact with the ground.

Drive Chain

Drive Chain Installation



- The direction of the master link clip [A] must be as shown.
  [B] Direction of the Drive Chain Rotation

⚠ WARNING

Incorrect installation of the master link clip can allow it to catch on an adjacent part. If the clip dislodges, the chain could come apart, and this could result in rear wheel lockup and loss of control.

- Adjust the chain slack.

Chain Wear Inspection

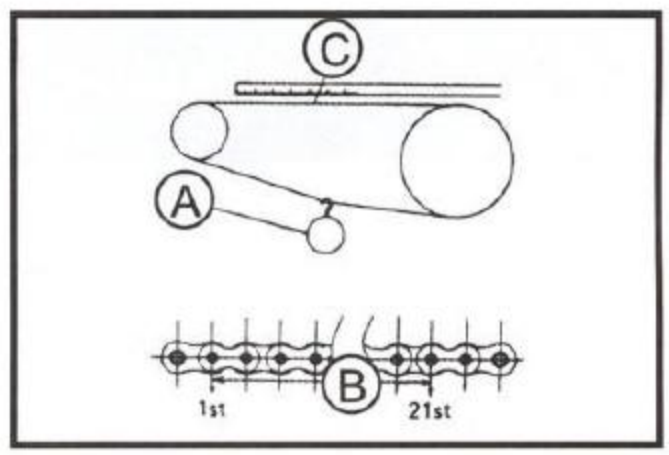
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
- Also inspect the sprockets for unevenly or excessively worn teeth, and damaged teeth.

NOTE

- *Sprocket wear is exaggerated for illustration.*

★ If there is any irregularity, replace the drive chain and sprockets.

- If the chain appears dry, lubricate it.
- Remove the chain cover.
- Stretch the chain taut by hanging a 98 N (10 kg, 20 lb) weight [A] on the chain.
- Measure [B] the length of 20 links [D] on the straight part [C] of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.



• If any measurement exceeds the service limit, replace the chain. Also, replace the engine and rear sprockets when the drive chain is replaced.

⚠ WARNING

If the drive chain wear exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. For safety, use only the standard chain.

Drive Chain 20-Link Length

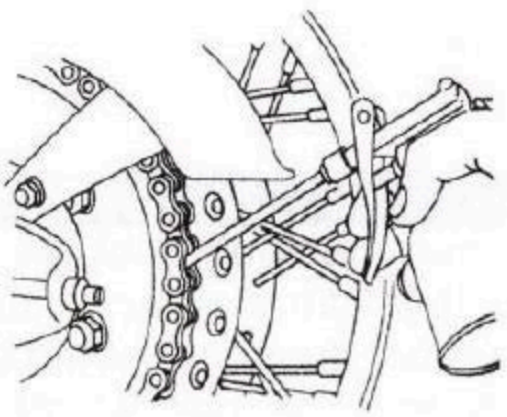
Standard:	**254.0 ~ 254.6 mm**
Service Limit:	**259 mm**

Drive Chain

Chain Lubrication

The chain should be lubricated with a lubricant that will both prevent its exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication. If a special lubricant is not available, heavy oil such as SAE 90 is preferred to lighter oil because it will stay on the chain longer and provide better lubrication.

- If the chain appears especially dirty, it should be cleaned before lubrication.
- Apply oil to the sides of the rollers and between the side plates of the links so that oil will penetrate to the bushings and pins where most wear takes place.
- Wipe off any excess oil.

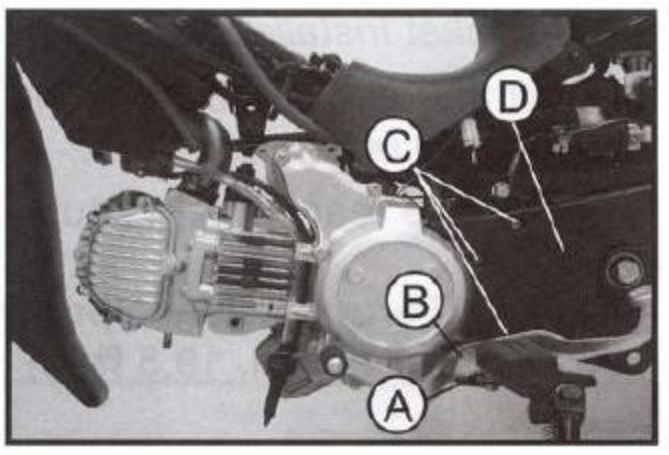


Apply oil.

Sprockets, Coupling

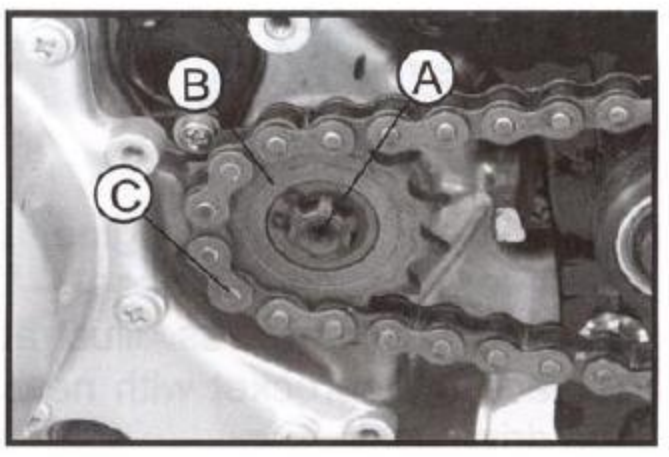
Engine Sprocket Removal

- Remove
  - Bolt [A]
  - Shift Pedal [B]
  - Bolts [C]
  - Engine Sprocket Cover [D]



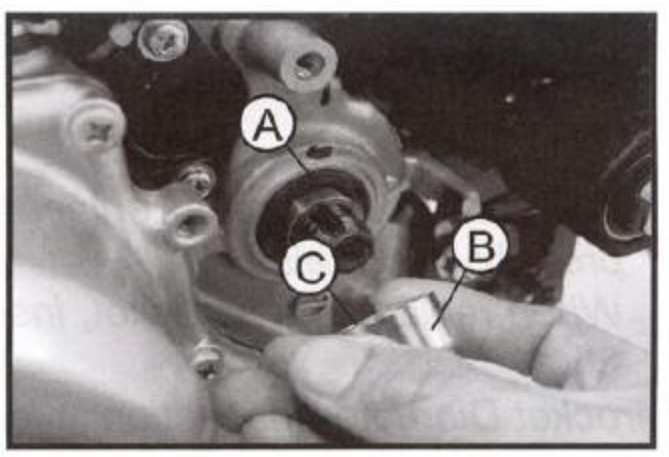
- Remove the circlip [A] and take off the sprocket [B] with drive chain [C].
- Pull the collar and O-ring off the output shaft.

Special Tool - Outside Circlip Pliers:
57001-144

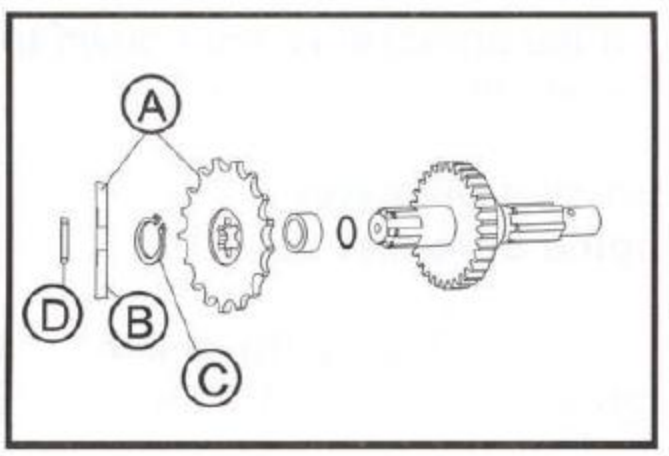


Engine Sprocket Installation

- Apply high-temperature grease to the O-ring.
- Install the O-ring [A] and collar [B] to the output shaft.
- The chamfered side [C] of the collar must be faced in.

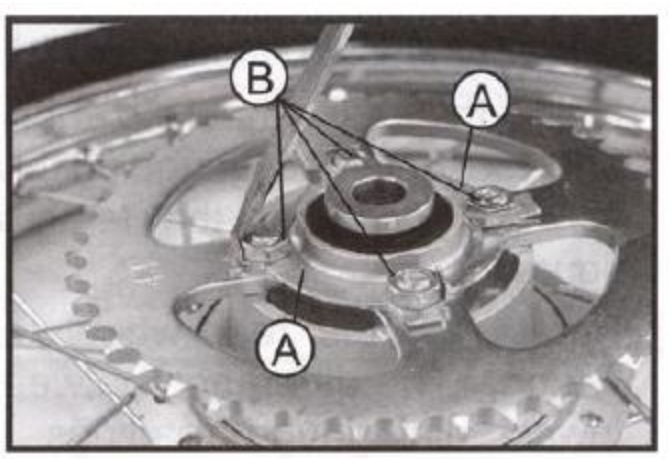


- Install the engine sprocket [A] with the surface side [B] facing in, and drive chain together.
- Fit the circlip [C] with the round side facing [D] in as shown.
- Adjust the drive chain slack if necessary.
- Install the engine sprocket cover.



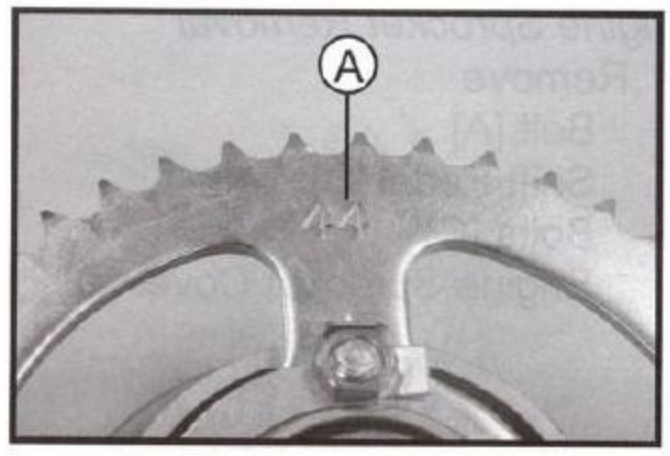
Rear Sprocket Removal

- Remove the rear wheel (see Wheels/Tires chapter).
- Straighten the side of the double lockwasher [A] that it bent over the side of the rear sprocket nut [B].
- Remove the rear sprocket nuts and double lockwashers to separate the rear sprocket and coupling.



Sprockets, Coupling

Rear Sprocket Installation

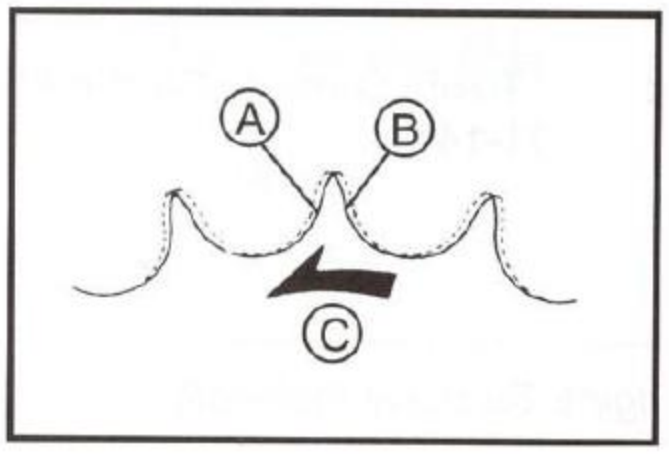


- Install the rear sprocket facing the tooth number making [A] outward.
- Tighten the rear sprocket nuts.

Tightening Torque - Rear Sprocket Nut:
26 N-m (2.7 kgf-m, 19.5 ft-lb)

- Bend the one side of the double lockwasher over the rear sprocket nuts.
- Install the rear wheel.

Sprocket Wear Inspection



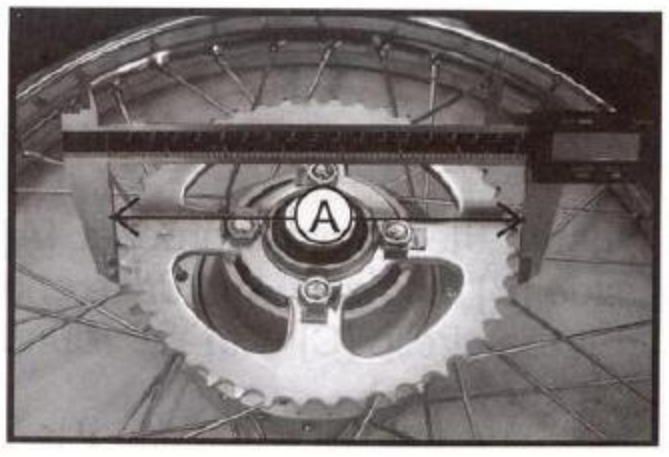
- Visually inspect the engine and rear sprocket teeth for wear and damage.

★ If they are worn as illustrated or damaged, replace the sprocket with new ones and inspect the drive chain wear.
Worn Tooth (Engine Sprocket) [A]
Worn Tooth (Rear Sprocket) [B]
Direction of Rotation [C]

NOTE

o *If a sprocket requires replacement, the chain is probably worn also.*
When replacing a sprocket, inspect the chain.

Sprocket Diameter Inspection



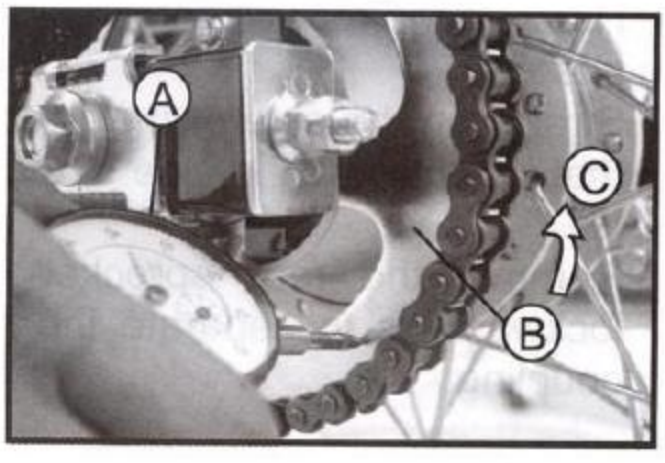
- Measure the diameter of the sprocket at the base of the tooth.

★ If the sprocket is worn down to less than service limit, replace the sprocket.

Sprocket Diameter
Engine Sprocket

	Engine Sprocket	Rear Sprocket
Standard:	**43.97~44.17mm**	**169.57~170.07mm**
Service Limit:	**43.4 mm**	**169.3 mm**

Rear Sprocket Warp Inspection



- Raise the rear wheel so that it will turn freely, and set a dial gauge [A] against the rear sprocket [B] near the teeth as shown in the figure.
- Rotate [C] the rear wheel, and read the dial gauge. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

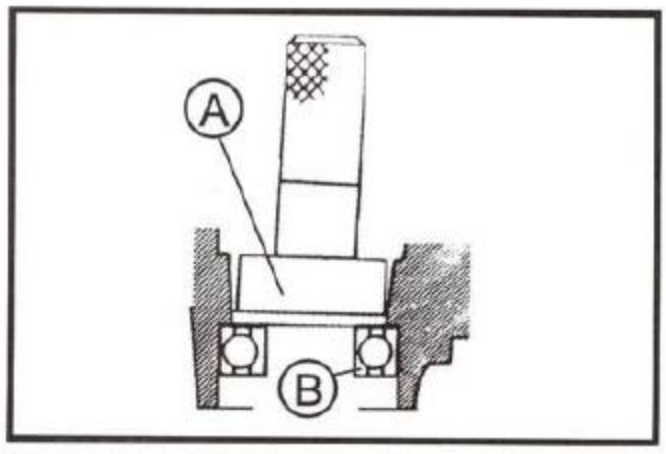
Sprockets, Coupling

★ If the runout exceeds the service limit, replace the rear sprocket.

Rear Sprocket

Rear Sprocket Warp
Standard: Less than 0.4 mm
Service Limit: 0.5 mm

Coupling Bearing Removal
- o Pull out the coupling collar from the left.
- o Remove the oil seal.
- o Using the bearing driver set [A] or some other suitable tool, remove the bearing [B] by tapping from the drum side.



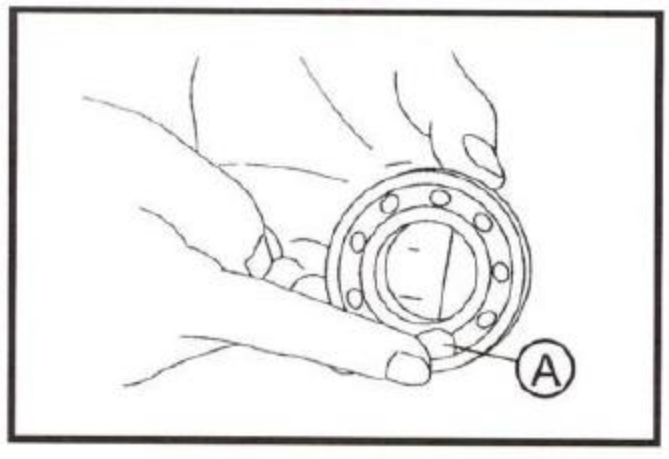
Special Tool - Bearing Driver Set: 57001-1129

Coupling Bearing Installation
- o Inspect the bearing, and replace it if necessary.
- o Press in the bearing so that the marked side faces out until it is bottomed.
- o Replace the oil seal with a new one.
- o Press in the oil seal so that the seal surface is flush with the end of the hole.
- o Apply high-temperature grease to the oil seal lips.

Special Tool - Bearing Driver Set: 57001-1129

Coupling Bearing Inspection and Lubrication

Since the coupling bearing is made to extremely close tolerances, the clearance cannot normally be measured.
- o Wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.
- • If it is noisy, doesnít spin smoothly, or has any rough sports, it must be replaced.
- o If the bearing is to be used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease. Turn the bearing around by hand a few times to make sure the grease [A] is distributed uniformly inside the bearing, and wipe the old grease out of the coupling before bearing installation.

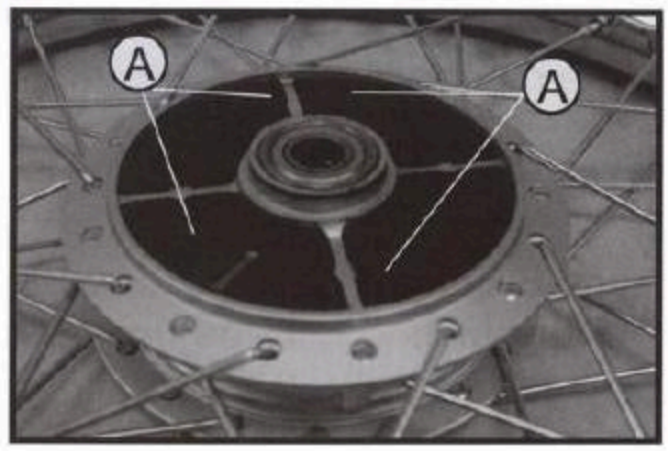


Sprockets, Coupling

Coupling Damper Inspection

o Remove the rear wheel coupling, and inspect the rubber dampers [A].

★ Replace the dampers if they appear damaged or deteriorated.



Brakes

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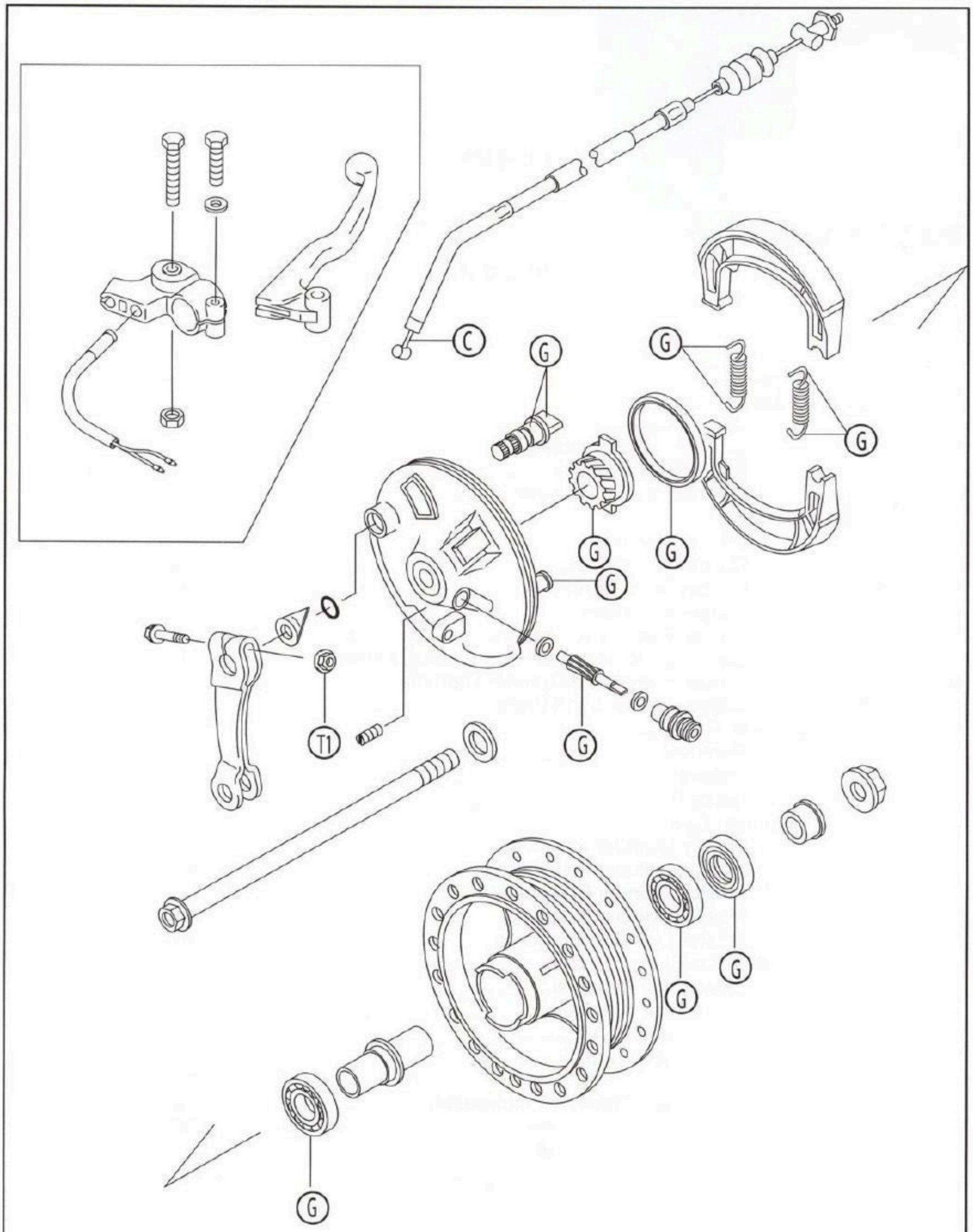
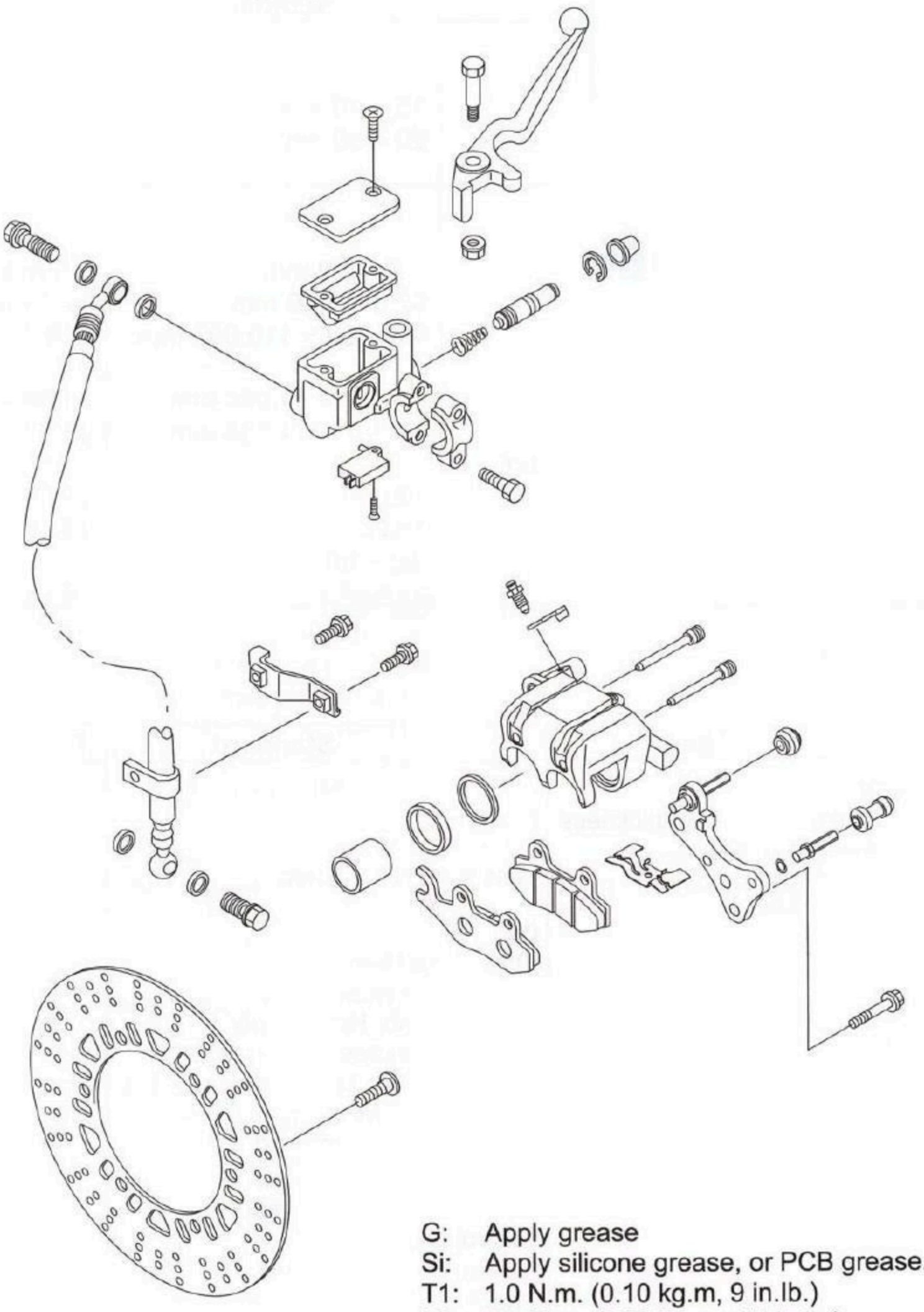
Exploded View



C: Apply cable lubricant.
G: Apply grease.
T1: 6.9 N-m (0.7 kg-m, 61 in-lb)

Exploded View



G: Apply grease
Si: Apply silicone grease, or PCB grease.
T1: 1.0 N.m. (0.10 kg.m, 9 in.lb.)
T2: 2.0 N.m. (0.20 kg.m., 17 in.lb.)
T3: 5.9 N.m. (0.60 kg.m., 52 in.lb.)
T4: 6.9 N.m. (0.70 kg.m., 61 in.lb.)
T5: 7.8 N.m. (0.80 kg.m., 69 in.lb.)
T6: 9.8 N.m. (1.0 kg.m., 87 in.lb.)
T7: 18 N.m. (1.8 kg.m., 13 ft.lb.)
T8: 23 N.m. (2.3 kg.m., 16.5 ft.lb.)
T9: 25 N.m. (2.5 kg.m., 18 ft.lb.)

Specifications

Item	Standard	Service Limit
Brake Lever and Pedal:		
Brake lever End Free Play	15 ~ 20 mm	---
Brake pedal free play	20 ~ 30 mm	---
Brake Drum, Brake Shoes:		
Shoe lining thickness	3.7 ~ 3.9 mm	1.9 mm
Shoe Spring Free Length	32.0 ~ 33.0 mm	34.1 mm
Drum inside diameter	110.000 ~ 110.087 mm	110.75 mm
Camshaft diameter		
Front	11.957 ~ 11.984 mm	11.88 mm
Rear	14.957 ~ 14.984 mm	14.88 mm
Camshaft hole inside diameter		
Front	12.000 ~ 12.027 mm	12.15 mm
Rear	15.000 ~ 15.027 mm	15.15 mm
Cam lever angle	80 ~ 90°	---

Item	Standard	Service Limit
Front Brake		
Brake pads lining thickness	6.0 mm	1 mm
Brake disc thickness	3.8 mm ~ 4.2 mm	3.5 mm
Brake disc runout	Less than TIR 0.2 mm	TIR 0.3 mm
Brake fluid:		
Grade	D.O.T.3	
Brand (recommended)	Atlas Extra Heavy Duty Shell Super Heavy Duty Texaco Super Heavy Duty Wagner Lockheed Heavy Duty Castrol Girling- Universal Castrol GT (LMA) Castrol Disc Brake Fluid	
Grade	D.O.T.4	
Brand (recommended)	Castrol Girling- Universal Castrol GT (LMA) Castrol Disc Brake Fluid Check Shock Premium Heavy Duty	

Special Tool - Inside Circlip Pliers: 57001-143

BRAKE FLUID

Level Inspection

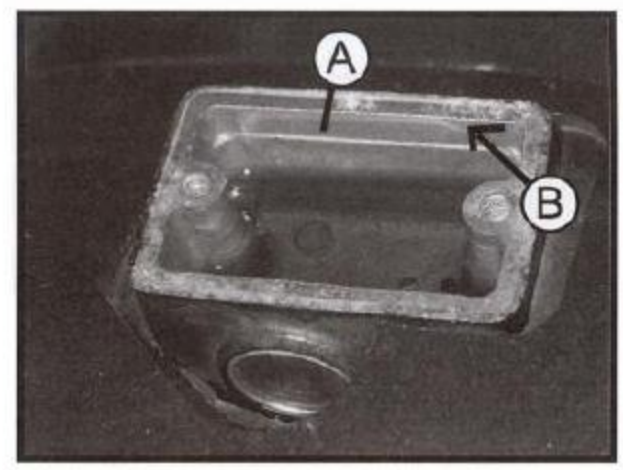
- In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front brake fluid reservoir.
- Check that the brake fluid level in the front brake reservoir [A] is between upper [B] and the lower [C] level lines.

A
USE ONLY DOT3 OR 4 BRAKE FLUID FROM A SEALED CONTAINER. CLEAN FILLER CAP BEFORE REMOVING.
WARNING
UTILISER DU LIQUIDE DE FREIN DOT3 OU 4.
B

NOTE

- *Hold the reservoir horizontal by turning the handlebar when checking brake fluid level.*

If the fluid level is lower than the lower level line, fill the reservoir to the upper level line.



WARNING

Do not mix two brands of fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter.

Brake Fluid Recommendation

Recommended fluids are given in the table below. If none of the recommended fluids are available, use extra heavy-duty brake fluid only from a container marked D.O.T.3 or 4.

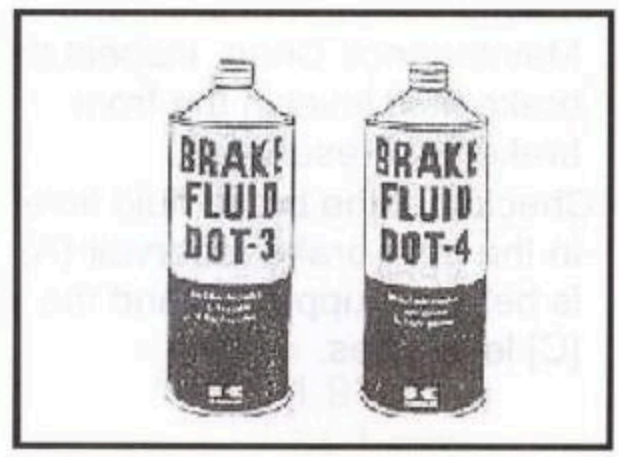
NOTE

- *Brake fluid of D.O.T 3 is installed in the brake system when shipped.*

BRAKE FLUID

Recommended Disc Brake Fluid

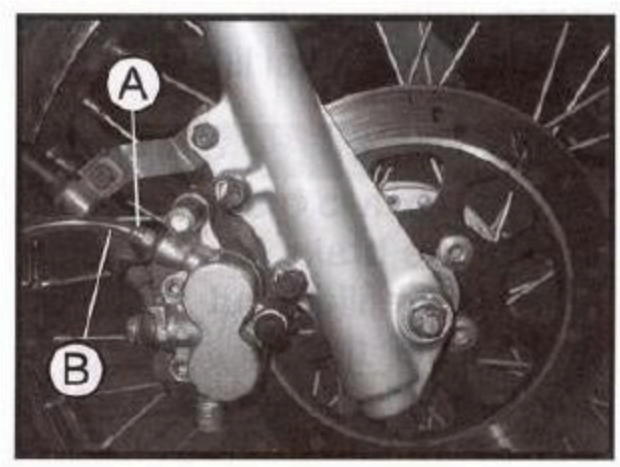
Type: D.O.T 3
Brand: Atlas Extra Heavy Duty
Shell Super Heavy Duty
Texaco Super Heavy Duty
Castrol Girling Universal
Castrol GT (LMA)
Castrol Disc Brake Fluid



Type: D.O.T.4
Brand: Castrol Girling Universal
Castrol GT (LMA)
Castrol Disc Brake Fluid
Check Shock Premium Heavy Duty

Brake Fluid Change

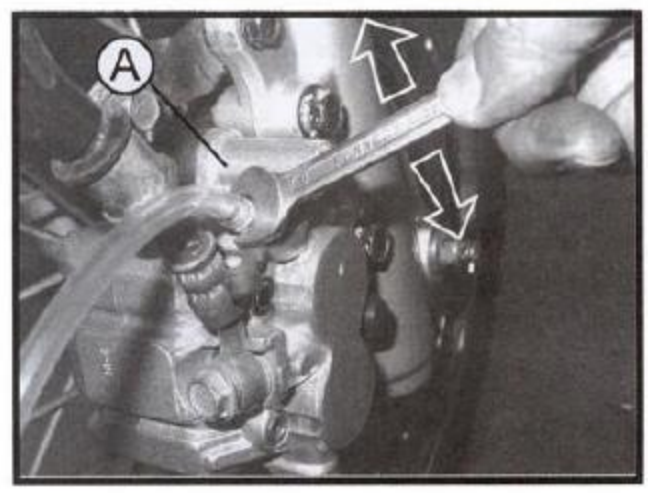
- Level the brake fluid reservoir.
- Remove the reservoir cap.
- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.
- Temporarily install the reservoir cap.
- Change the brake fluid as follows:



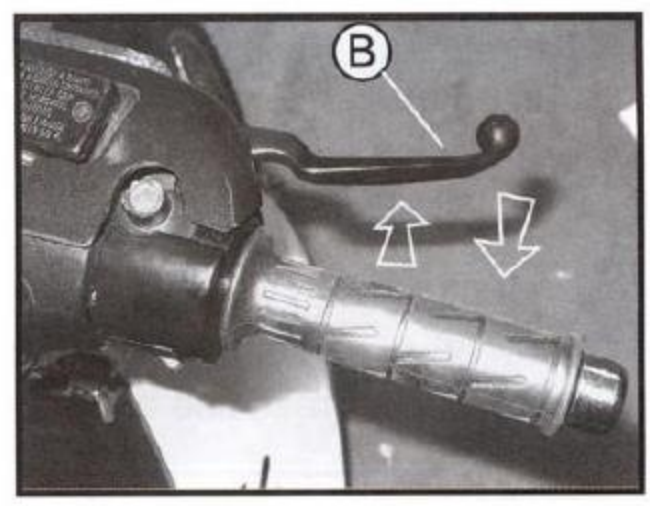
Brake fluid

NOTE

- The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out at any time during the changing operation, the brake will need to be bled since air will have entered the brake line.



- Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.



- Open the bleed valve [A].
- Pump the brake lever and hold it [B].
- Release the bleed valve [C].
- Release the brake lever [D].

- Remove the clear plastic hose.
- Install the reservoir cap.
- Tighten the bleed valve, and install the

Torque - Caliper Bleed Valve: 7.8 N-m (0.80 kg-m, 69 in - lb.)
Front Brake Reservoir cap Screws: 2.5 N-m (0.25 kg-m., 22 in lb.)

- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

If necessary, bleed the air from the lines.

Bleeding the Brake Line
The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever movement will be partially used in compressing the air. This will make the lever feel spongy, and it will be a loss in braking power.

Brake fluid

WARNING
Be sure to bleed the air from the brake line whenever brake lever action feels soft or spongy after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

- Remove the reservoir cap and fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- With the reservoir cap off, slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

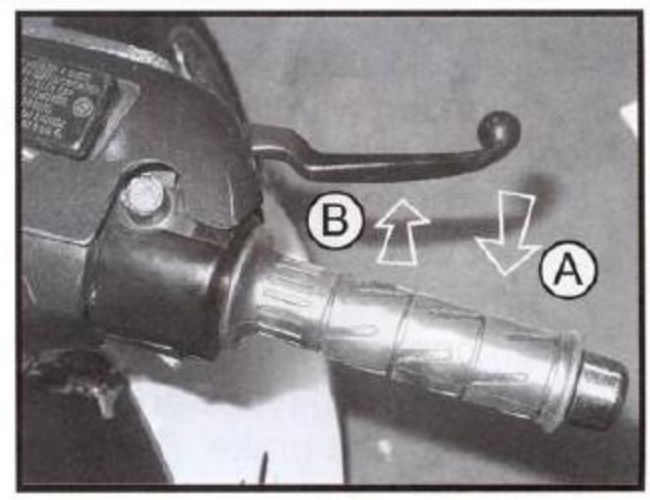
o Bleed the air completely from the master cylinder by this operation.

- Install the reservoir cap.
- Remove the rubber cap from the bleed valve on the caliper.
- Attach a clear plastic hose to the bleed valve, and run the other end of the hose into a container.
- Bleed the brake line and the caliper as follows:

Brake fluid

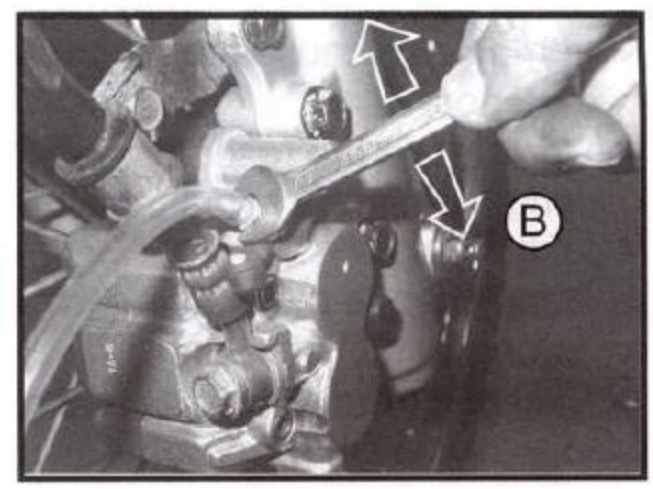
o Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake lever until it becomes hard, and apply the brake lever and hold it [A]
2. Quickly open and close [B] the bleed valve while holding the brake lever applied.
3. Release the brake lever [C]



NOTE

- The fluid level must be checked often during the bleeding
  operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during
  bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.
- Tap the brake hose lightly from the caliper to the reservoir
  for more complete bleeding.



1. Remove the clear plastic hose
2. Tighten the bleed valve, and install the rubber cap.
   Torque -
   Caliper Bleed Valve: 7.8 N-m
   (0.80 kg-m., 69 In-lb.)
   Front Brake Reservoir cap Screws: 2.5 N-m
   (0.25 kg-m., 22 in-Lb.)

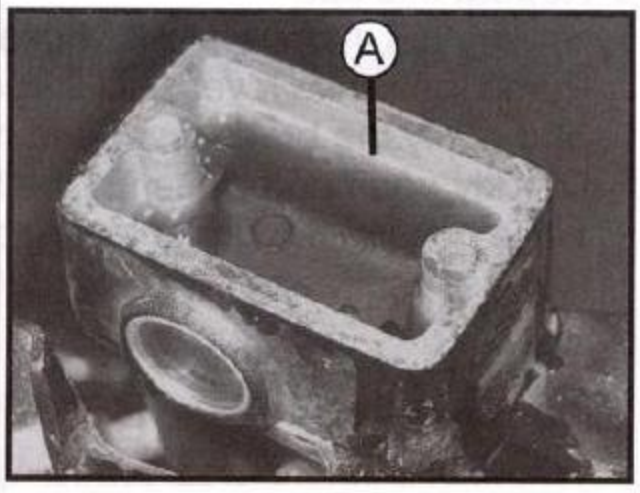
o Check the fluid level
o After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Brake fluid

WARNING

When working with the disc brake, observe the precautions listed below.

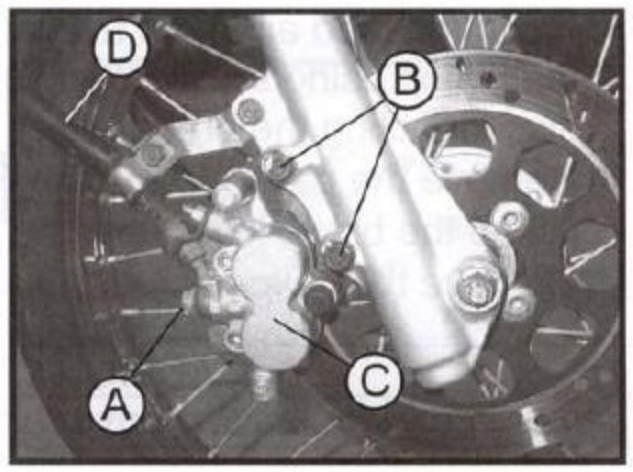
- Never reuse old brake fluid.
- Do not use fluid from a container that has been left unsealed or that has been open for a long time.
- Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
- Don't leave the reservoir cap [A] off for any length of timeto avoid moisture contamination of the fluid.
- Don't change the fluid in the rain or when a strong wind is blowing.
- Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
- When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high-flash point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
- Brake fluid quickly runs painted surfaces; Any spilled fluid should be completely washed away immediately.
- If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE LINE.**



Caliper

Caliper Removal

- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper (see Brake Hose Removal/Installation)



CAUTION
Immediately wash away any brake fluid that spills.

NOTE

o If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Caliper Disassembly)

Caliper Installation

- Install the caliper and brake hose lower end.

o Replace the washers that are on each side of hose fitting with new ones.

- Tighten the caliper mounting bolt and banjo bolt.

Torque - Caliper Mounting Bolts: 25 N-m (2.5 kg-m, 18.0 ft-lb.)
Brake Hose Banjo Bolt: 25N-m (2.5 kg-m, 18.0 ft-lb.)

- Check the fluid level in the brake reservoir.
- Bleed the brake line (see Bleeding the Brake Line)
- Check the brake for good braking power, no brake drag, and no fluid leakage.

WARNING
Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

Caliper Disassembly

- Remove the caliper (see caliper Removal).
- Remove the pads and spring (see Brake Pad Removal).
- Using compressed air, remove the piston.

o Lightly apply compressed air to the hose joint opening.

WARNING
To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

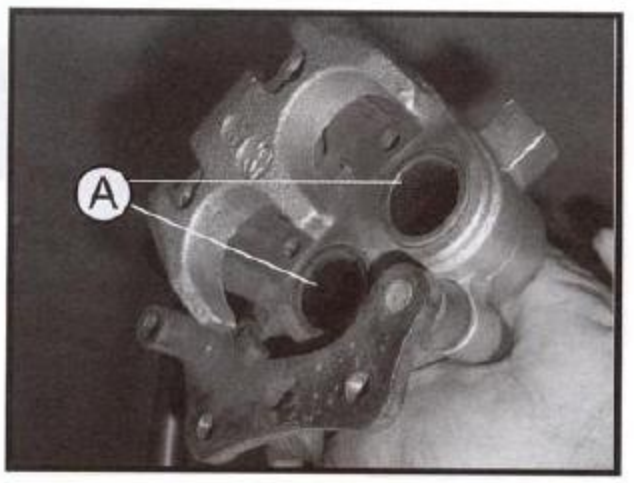
Caliper

★ If compressed air is not available, remove the piston using the following steps before disconnecting the brake hose from the caliper.

o Remove the pads (see Brake Pad Removal).

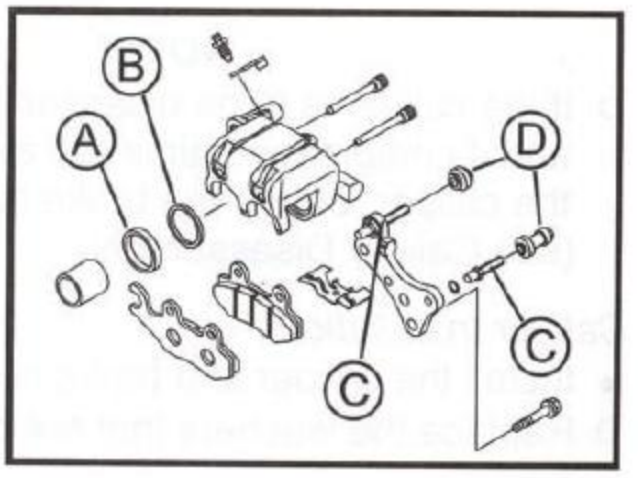
o Pump the brake lever until the piston [A] comes out.

o Remove the caliper.



CAUTION
Immediately wash away any brake fluid that spills.

- Remove the dust seal [A] and fluid seal [B].
- Remove the caliper holder [C], and shaft rubber friction boots [D].
- Remove the bleed valve and rubber cap.



Caliper Assembly

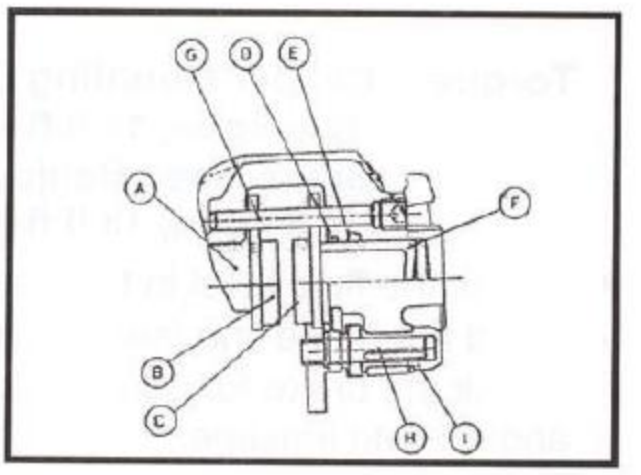
- Clean the caliper parts except for the pads [B, C]

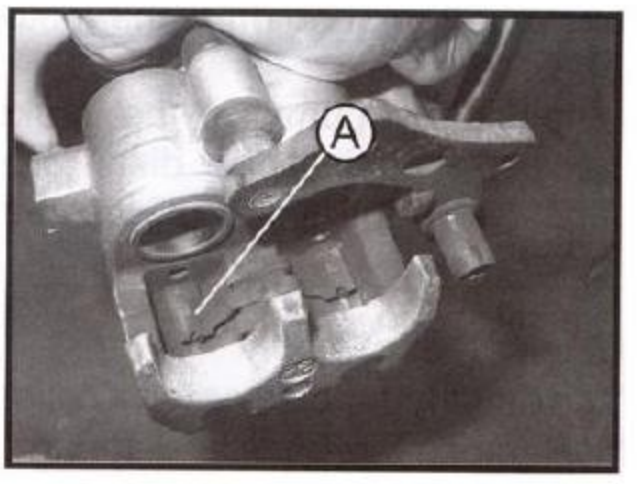
CAUTION
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

- Install the bleed valve and rubber cap.
  Torque - Caliper Bleed Valve:
  7.8 N-m (0.80 kg-m, 69 in-lb.)
- Replace the fluid seal [D] with a new one.

o Apply brake fluid to the seal, and install it into the caliper [A] by hand.

- Replace the dust seal [D] with a new one if it is damaged.
- Apply brake fluid to the dust seal, and install it into the caliper [A] by hand.
- Apply brake fluid to the inside of the cylinder and outside of the piston, and push the piston [F] into the cylinder by hand.
- Replace the caliper holder shaft rubber friction boots [I] if they are damaged.
- Apply a thin coat of silicone grease to the caliper holder shafts [H] and holder holes (Silicone grease is a special high temperature, water-resistance grease).
- Pad Mounting Bolts [G].
- Install the anti-rattle spring [A] in the caliper as shown.
- Install the pads (see Brake Pad Installation).
- Wipe up any spilled brake fluid on the caliper with wet cloth.

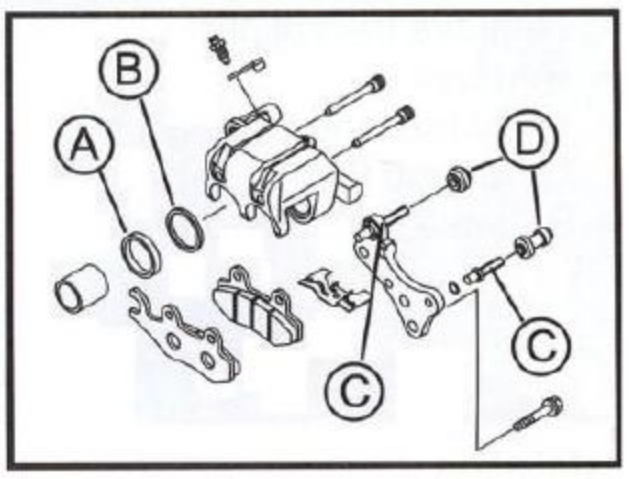




Caliper

Caliper Fluid Seal Damage

The fluid seal [A] around the piston maintains the proper pad/ disc clearance. If the seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.



- Replace the fluid seal under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in inner and outer pad wear; (d) the seal is stuck to the piston.

★ If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

Caliper Dust Seal and Friction Boot damage

- Check that the dust seal [B] and friction boots [C] are not cracked worn, swollen, or otherwise damaged.
- If they show any damage, replace them.

Caliper Piston and Cylinder Damage

- Visually inspect the piston [D] and cylinder surfaces.

★ Replace the caliper if the cylinder and piston are badly scored or rusty.

Caliper Holder Shaft Wear

The caliper body must slide smoothly on the caliper holder shafts [E]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc raises brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber friction boots are not damaged.

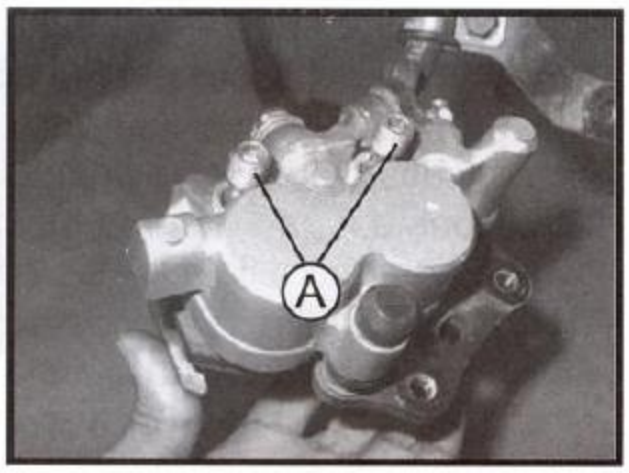
★ If the rubber friction boot is damaged, replace the rubber friction boot.

★ If the caliper holder shaft is damaged, replace the caliper.

Brake pads

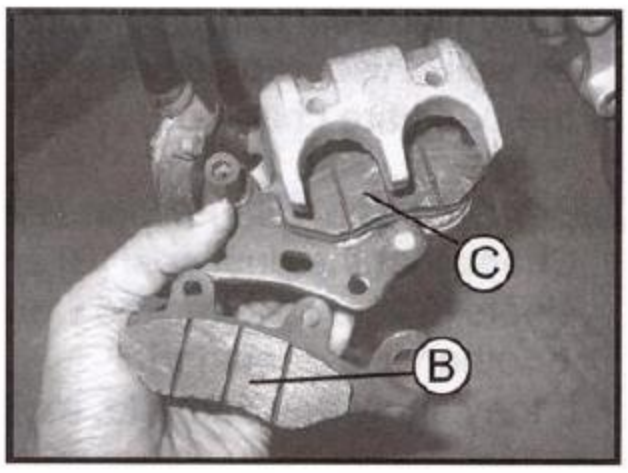
Removal

- Remove the caliper with the hose installed.
- Remove :
  Pad Mounting Bolts [A]
  Outer pad [B]
- Remove the inner pad (piston side pad) [C].



Installation

- Before installation, clean the pads with a high -flash point solvent.
- Push the caliper piston in by hand as far as they will go.
- o Do not mix up the outer pad and the inner pad.
- Tighten the pad mounting bolts.
  Torque - Pad Mounting bolts:
  18 N-m (1.8kg-m. 13.0 ft-lb.)



WARNING

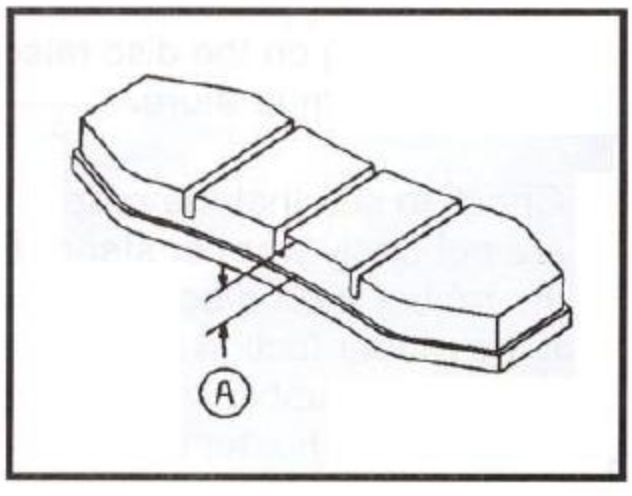
Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc.
The brake will not function on the first application of the lever if this is not done.

Brake Pad Wear Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake pads for wear.

- Remove the pads
- Check the lining thickness [A] of the pads in the caliper.
- If the lining thickness of either pad is less than the service limits, replace both pads in the caliper as a set.

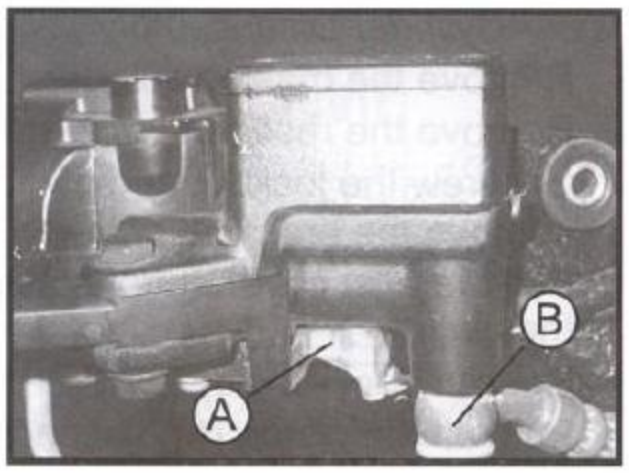
Pad Lining Thickness
Standard: 6 mm
Service Limit: 1 mm



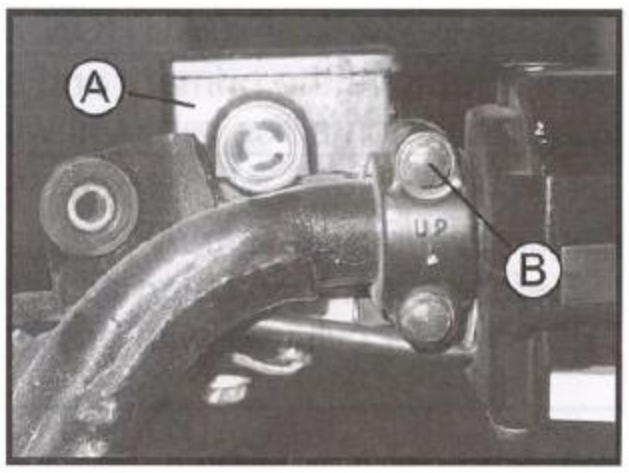
Master cylinder

Master Cylinder Removal

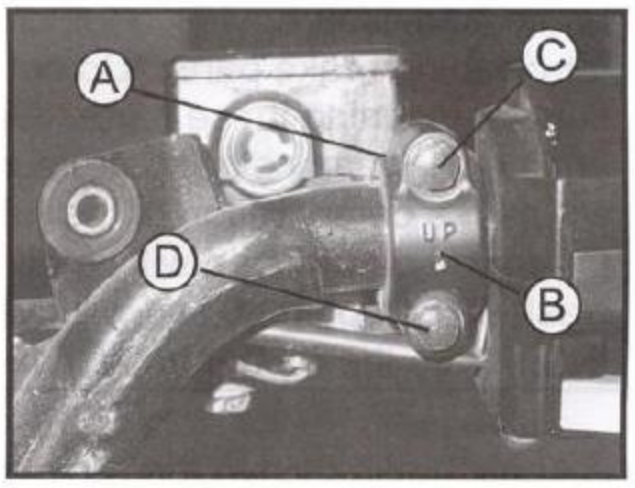
- Remove the brake fluid from the reservoir with a syringe or other suitable device.
- Disconnect the front brake light switch connectors [A].
- Remove the banjo bolt [B] to disconnect the brake hose from the master cylinder.



- Unscrew the clamp bolts [A] and take off the master cylinder [B] as an assembly with the reservoir, brake lever, and brake switch installed.
- When removing the master cylinder, take care not to spill the brake fluid on the painted or plastic parts.



CAUTION
Brake fluid quickly ruins painted or plastic surfaces; any spilled fluid should be completely washed away immediately.



Master Cylinder Installation.

- Set the master cylinder to match its mating face to the punch mark [A] of the handlebar.
- The master cylinder clamp must be installed with the arrow mark [B] faced upward.
- Tighten the upper clamp bolt [C] first and then the lower clamp bolt [D]. There will be a gap at the lower part of the clamp after tightening.

  Torque - Front Master Cylinder Clamp Bolts: 8.8 N -m (0.90 kg-m, 78 in-lb.)

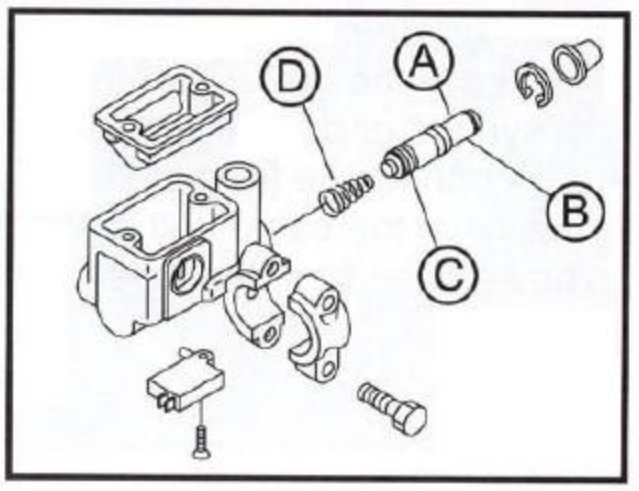
- Use a new flat washer on each side of the brake hose fitting.
- Tighten the brake hose banjo bolt.

  Torque - Brake Hose Banjo Bolt: 25N-m (2.5 kg-m, 18.0 ft- lb.)

- Fill the reservoir with fresh specified brake fluid and bleed the brake line (see Bleeding the Brake Line).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Master cylinder

Master Cylinder Disassembly



- Remove the master cylinder.
- Remove the reservoir cap and diaphragm.
- Unscrew the locknut and pivot bolt, and remove the brake lever.
- Pull the dust cover out of place, and remove the circlip.
- Special Tool - Inside Circlip Pliers : 57001-143.
- Pull out the piston [A], secondary cup [B], primary cup [C], and return spring [D].

CAUTION
Do not remove the primary and secondary cups from the piston since removal will damage them.

Master Cylinder Assembly

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION
Except for the disc pads and disc, use only brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- Apply brake fluid to the removed parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply a little silicone grease to the following points.
  Silicone Grease - Brake Lever Pivot Bolt
  Brake Lever Pivot Contact
- Tighten the brake lever pivot and the locknut.
  Torque - Brake lever Pivot Bolt:
  5.9N-m (0.60 kg-m, 52 in -lb.)
  Brake Lever Pivot Bolt Locknut:

Master cylinder

Master Cylinder Inspection

- Disassemble the master cylinder.
- Check that there are no scratches, rust or pitting on the inner wall of the master cylinder [A] and on the outside of the piston [B].
  If a master cylinder or piston shows any damage, replace them.
- Inspect the primary [C] and secondary [D] cups.

★ If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

- Check the dust cover [E] for damage.

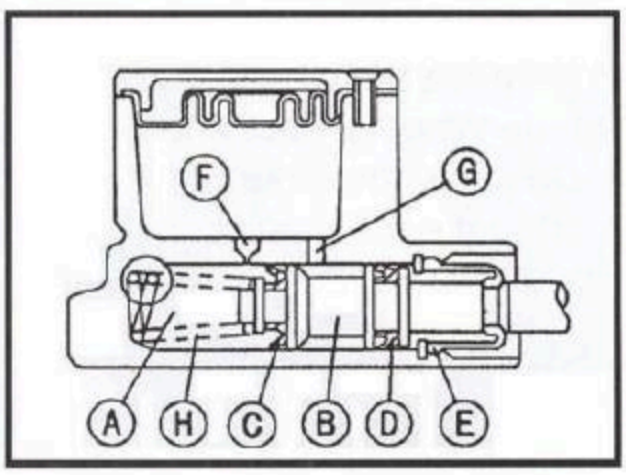
★ If it is damaged, replace it.

- Check that relief [F] and supply [G] ports are not plugged.

★ If the relief port becomes plugged, the brake pads will drag on the disc.

- Blow the ports clean with compressed air.
- Check the piston return springs [H] for any damage.

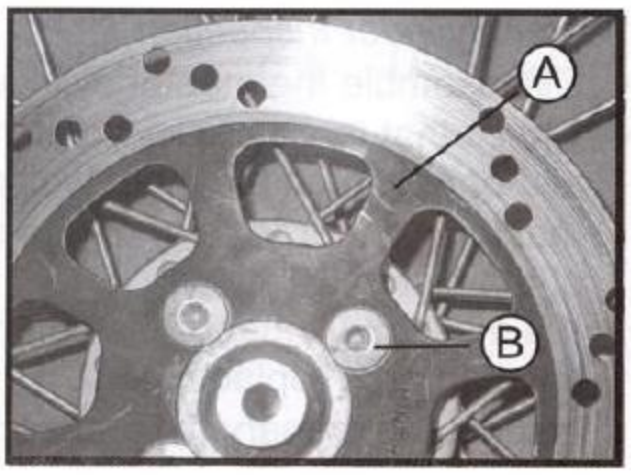
★ If the spring is damaged, replace it.



Brake disc

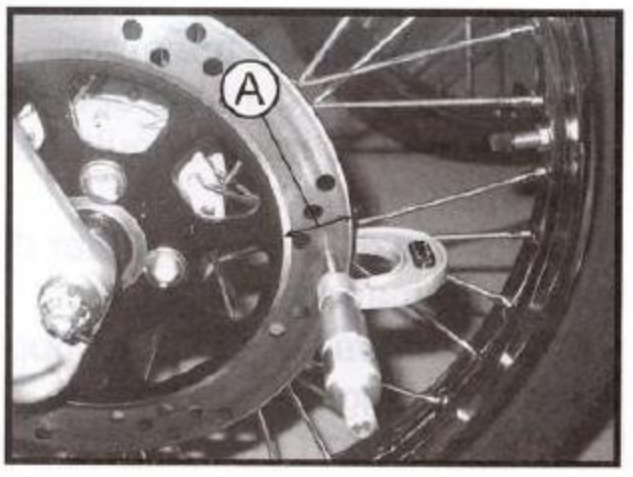
Brake Disc Removal

- Remove the wheel (see Wheels/Tires chapter)
- Unscrew the mounting bolts, and take off the disc.



Brake Disc Installation

- Install the brake disc on the wheel so that the marked side [A] faces out.
  Tighten the brake disc bolts [B].
  Torque - Brake Disc Bolts:
  27 N-m. (2.8 kg-m., 20 ft -lb.)



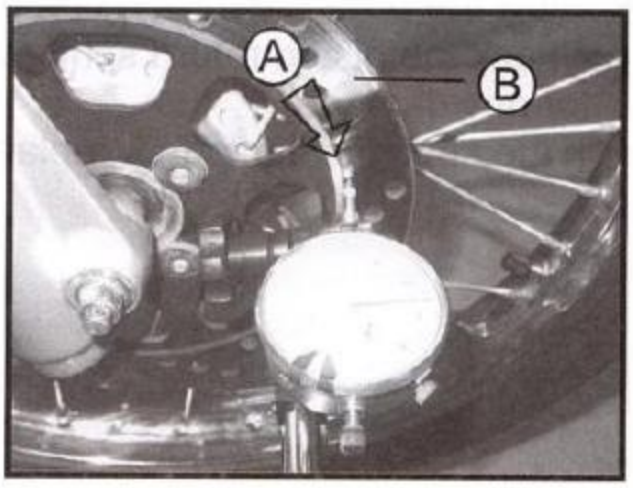
Brake Disc Wear

- Inspect the disc.

★ If the disc is damaged or cracked, replace it.

- Measure the thickness of the disc at the sliding surface [A].

★ Replace the disc if it has worn past the service limit.



Front Disc Thickness
Standard: 3.8 ~ 4.2mm
Service Limit: 3.5 mm

Brake Disc Warp

- Jack up the motorcycle so that the front wheel is off the ground (see Wheels/ Tires chapter).
- Set up a dial gauge against the disc [B] as shown and measure disc runout while turning [A] the wheel by hand.

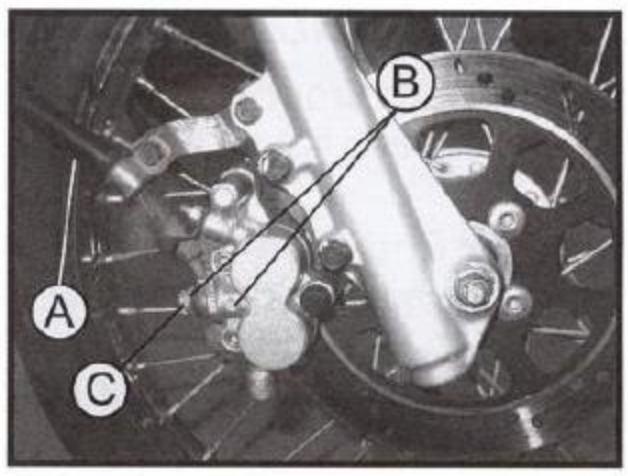
★ If runout exceeds the service limit, replace the disc.

Disc Runout
Standard: TIR 0.2mm or less
Service Limit: TIR 0.3 mm

Brake horse

Brake Hose Removal / Installation

CAUTION
Brake fluid quickly ruins painted or plastic surfaces; any spilled fluid should be completely washed away immediately.



- When removing the brake hose, take care not to spill the brake fluid on the painted or plastic parts.
- When removing the brake hose [A], temporarily secure the end of the brake hose to some high place to keep fluid loss to minimum.
- There are washers [B] on each side of the brake hose fitting. Replace them with new ones when installing.
- When installing the hose, avoid sharp bending, kinking, flattening or twisting and route the hose according to Cable, Wire and Hose Routing section in the General Information chapter.
- Tighten the banjo bolts [C] on the hose fittings.

Torque - Brake Hose Banjo Bolts:
25N-m. (2.5 kg-m., 18.0 ft-lb.)

- Fill the brake line after installing the brake hose (see Brake Fluid changing).

Brake Hose Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★ Replace it if any cracks or bulges are noticed.

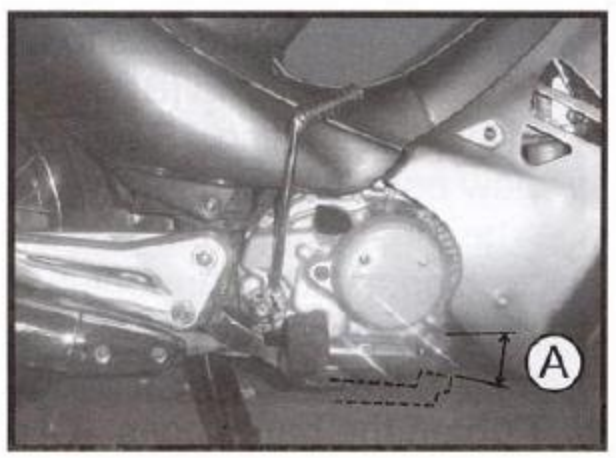
Brake Lever, Brake Pedal

Brake Lever, Brake Pedal Free Play Inspection

- Check the front brake lever end free play [A] when the brake is lightly applied.

Lever End Free Play
Standard: 15 ~ 20 mm

★ If the lever has improper play, adjust it.
- Operate the lever a few times to see that it returns to its rest position immediately upon release.



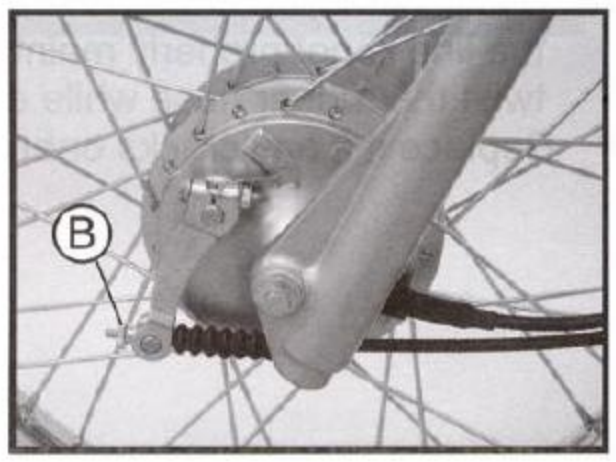
- Check the brake pedal free play [A] when the pedal is pushed down lightly by hand.

Brake Pedal Free Play
Standard: 20 ~ 30 mm

★ If the pedal has improper play, adjust it.
- Operate the pedal a few times to see that it returns to its rest position immediately upon release.
- Rotate the rear wheel to check for brake drag.
- Check braking effectiveness.

★ If there is any doubt as to the conditions of the brake, check the brake parts for wear or damage.

Front Brake Free Play Adjustment

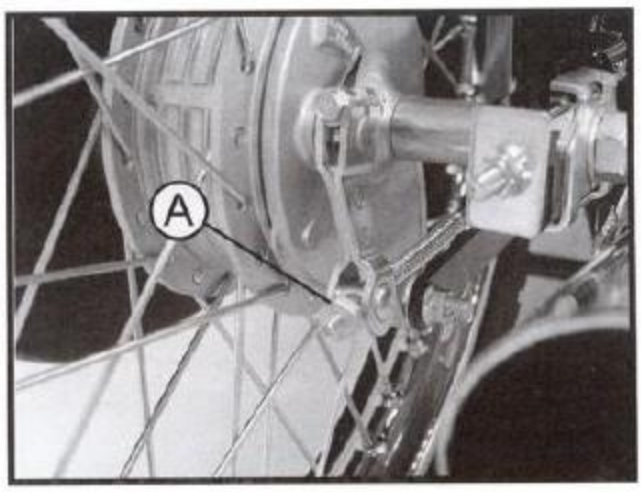


- Turn the adjusting nut [A] at the brake cam lever so that the lever has proper play.

Brake Lever, Brake Pedal

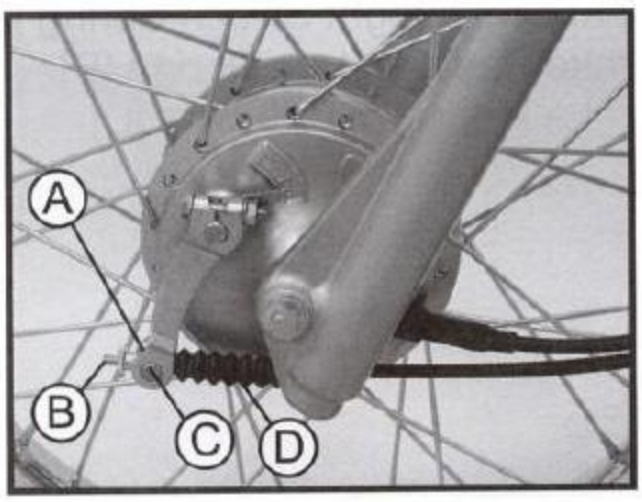
Brake Pedal Free Play Adjustment

- Turn the adjusting nut [A] at the brake cam lever so that the pedal has proper play.



Brake Cable Removal

- Remove:
  Front Brake Adjusting Nuts [A]
  Brake Cable Lower End [B]
  Front Brake Cam Lever Joint [C]
  Dust Cover [D] with Spring
  Meter Cover (see Frame chapter)
  Headlight Cover (see Frame chapter)
- Free the brake cable from the lever.
- Pull the brake cable out of the frame.



Brake Cable Installation

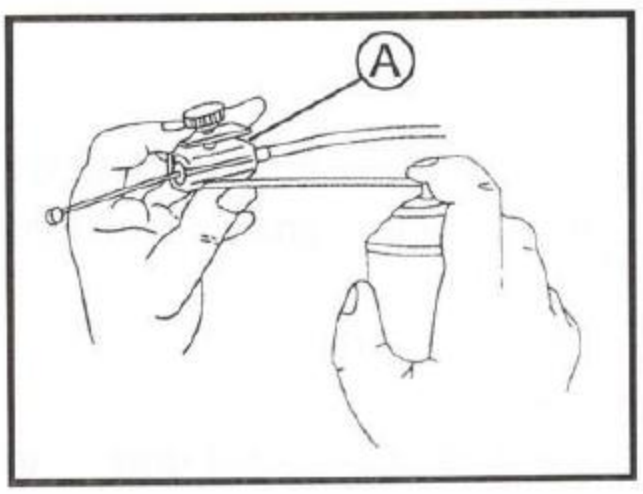
- Run the brake cable according to the Cable, Wire, and Hose Routing Section of the General Information chapter.
- Adjust the brake lever end free play.

Brake Cable Lubrication

Whenever the brake cable is removed, lubricate the cable as follows:

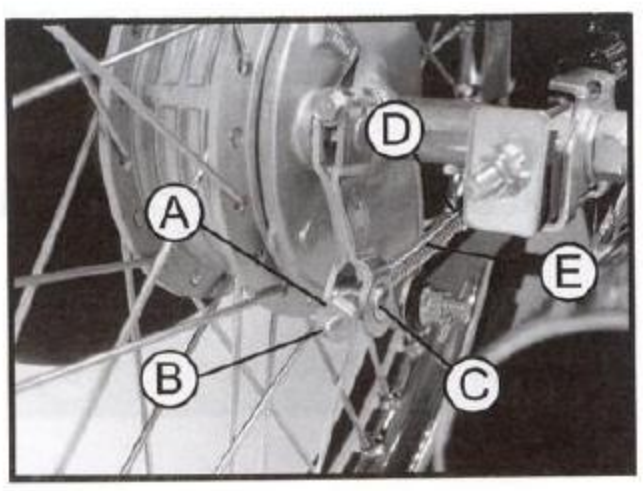
- Lubricate the cable with a penetrating rust inhibitor.

Special Tool - Pressure Cable Luber:
K56019-021 [A]



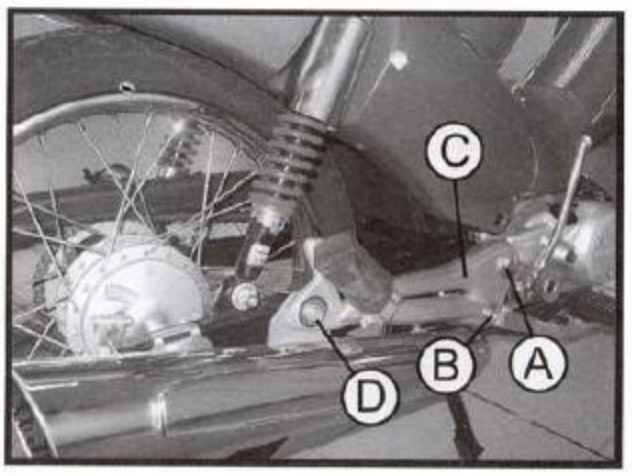
Brake Pedal and Rod Removal

- Remove:
  Rear Brake Adjusting Nut [A]
  Brake Rod [B]
  Brake Cam Lever Joint [C]
  Washer [D]
  Spring [E]

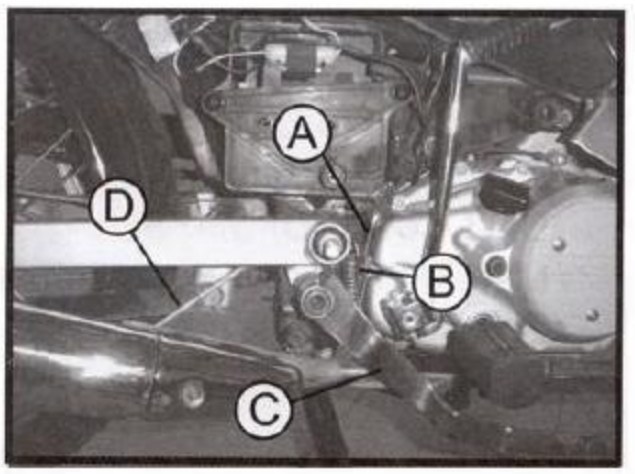


Brake Lever, Brake Pedal

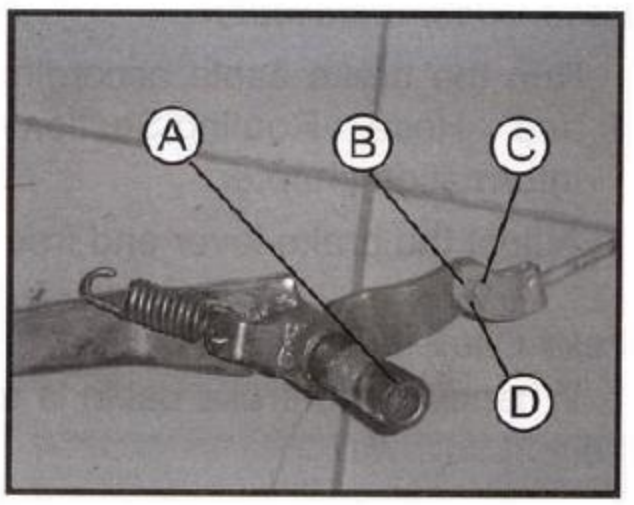
Swingarm Bolt Cap
Rear Right Footpeg Bracket Nut [A] and Bolt [B]
Muffler Mounting Bolt [C] and Nut
Rear Right Footpeg Bracket [D]



Rear Brake Light Switch Spring [A]
Brake Pedal Return Spring [B]
Brake Pedal [C] with Rod [D]

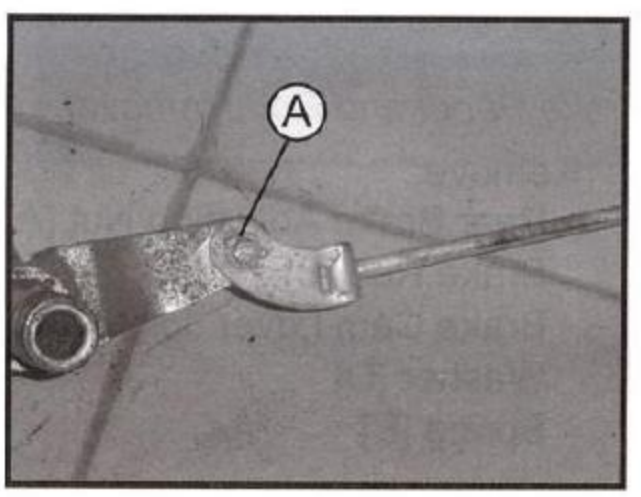


Brake Pedal Sleeve [A]
Cotter Pin [B]
Joint Pin [C]
Washer [D]



Brake Pedal and Rod Installation

- Brake pedal and rod installation is the reverse of removal.
- Bend the cotter pin [A] securely on both sides as shown.
- Apply multi purpose grease to the sleeve outside.
- Before installation the brake pedal, set in the return spring each end to the brake pedal.
- Tighten the rear right footpeg bracket bolt and nut.

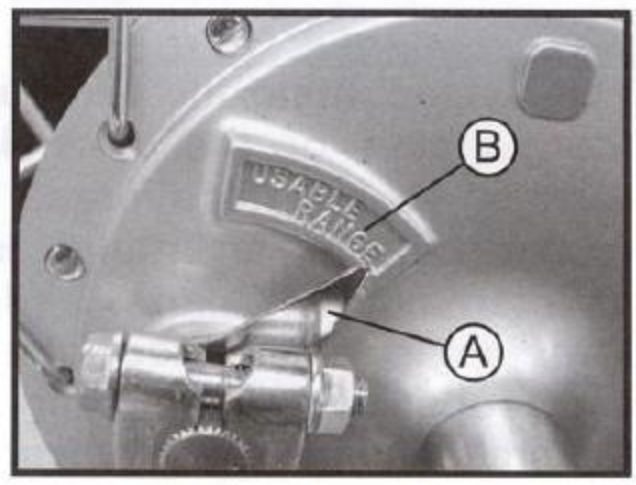


Torque - Rear Right Footpeg Bracket Bolt and Nut: 59 N-m (6.0 kg-m, 43 ft-lb)

- Adjust the brake pedal free play.

Brake Panel and Drum

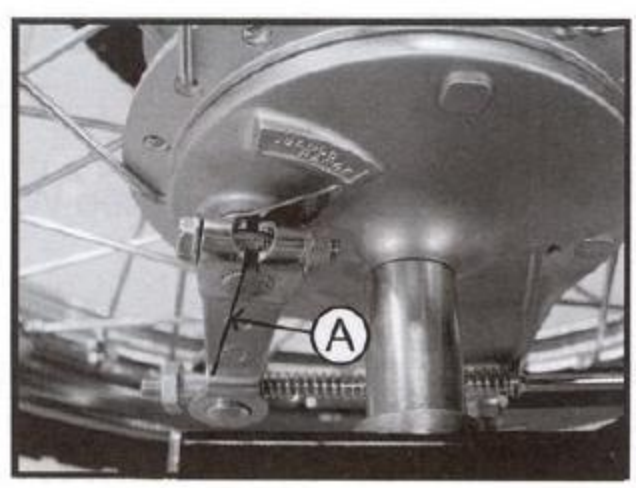
Brake Lining Wear Inspection



- Check the brake lining wear indicator [A] points within the USABLE RANGE [B] when the brake is fully applied.

★ If does not, the brake shoes must be immediately replaced and the other brake parts examined.

- Check that the brake cam lever comes to an 80°~90° angle [A] with the brake rod when the brake is fully applied.



★ If it does not, adjust the brake cam lever angle.

Cam lever Angle
Standard: 80 ~ 90°

⚠ WARNING

Since a cam lever angle greater than 90° reduces braking effectiveness, cam lever angle adjustment should not be neglected.

Cam Lever Angle Adjustment

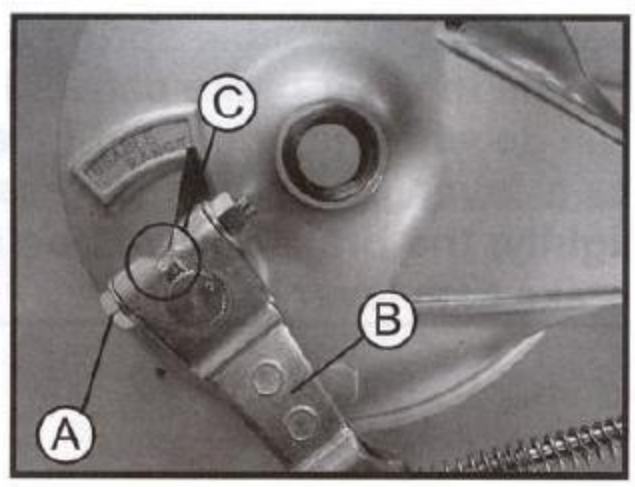
CAUTION

Do not depress the brake pedal deeply in order to separate the brake rod from the brake cam lever joint, this may extend the brake spring beyond its allowable spring extension.
Rotate the rear brake panel clockwise as far as it will go with the brake rod inserted into the brake cam lever joint, then depress the brake pedal lightly, the brake rod will be separated from the brake cam lever joint.

- Remove the wheel (see Wheels/Tires chapter).
- Remove the bolt [A], and take off the cam lever [B].

o Before removing the brake cam lever, mark [C] on the cam lever and camshaft at the same position.

- Mount the cam lever at a new position so that the cam lever has a proper angle when the brake is fully applied.



Brake Panel and Drum

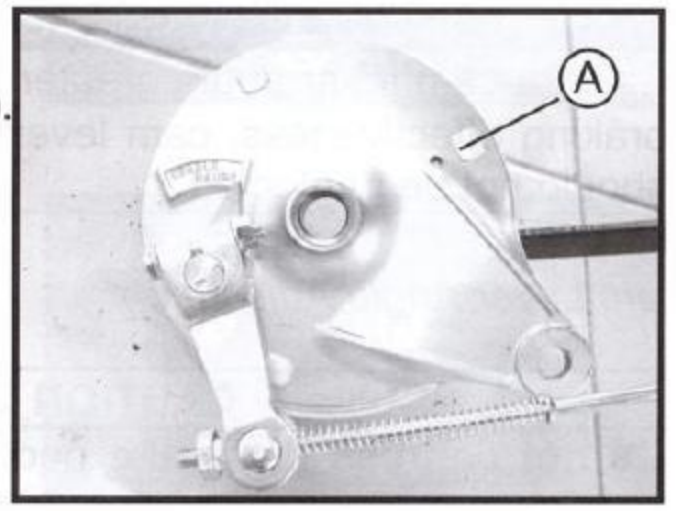
⚠ WARNING

When remounting the cam lever, be sure that the position of the wear indicator on the serrated shaft is not altered.
A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper operation, taking particular note of the brake lining wears indicator position.
In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn part shall result in the brake to lock or fall.

- Install the rear wheel (see Wheels/Tires chapter).
- Adjust the brake play.

Brake Panel Removal

- Remove the rear wheel (see Wheels/Tires chapter).
- Separate the brake panel [A] from the wheel.



Brake Panel Installation

- Installation is the reverse of removal.
- Adjust the brake pedal free play.

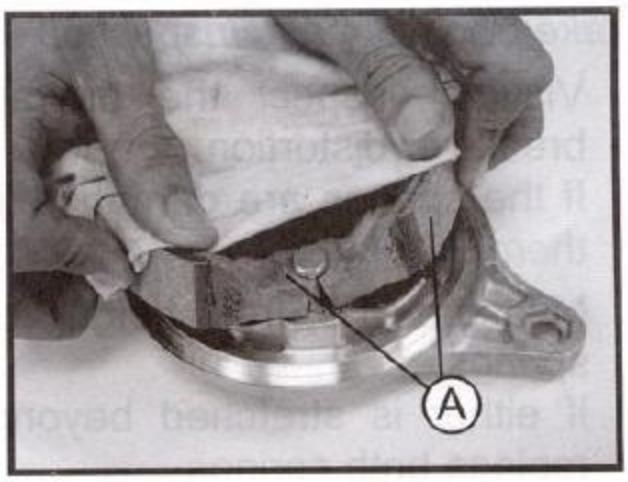
Brake Panel Disassembly

CAUTION

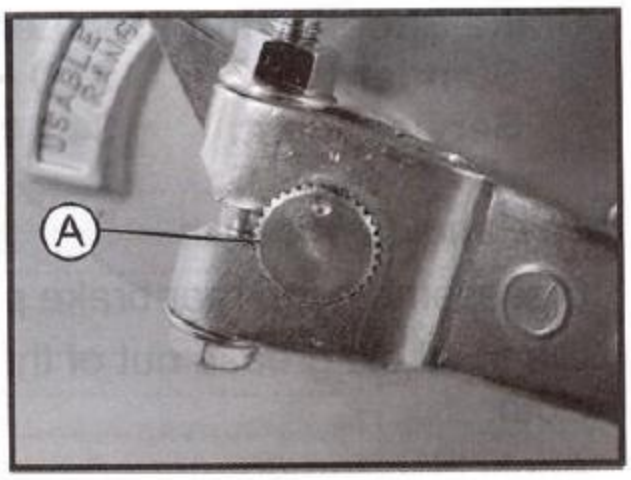
Do not depress the brake pedal deeply in order to separate the brake rod from the brake cam lever joint, this may extend the brake spring beyond its allowable spring extension.
Rotate the rear brake panel clockwise as far as it will go with the brake rod inserted into the brake cam lever joint, then depress the brake pedal lightly, the brake rod will be separated from the brake cam lever joint.

Brake Panel and Drum

- Remove the wheel and separate the brake panel from the wheel.
- Using a clean cloth around the linings to prevent grease or oil from getting on them, remove and install the brake shoes [A] by pulling up on the center of the linings.

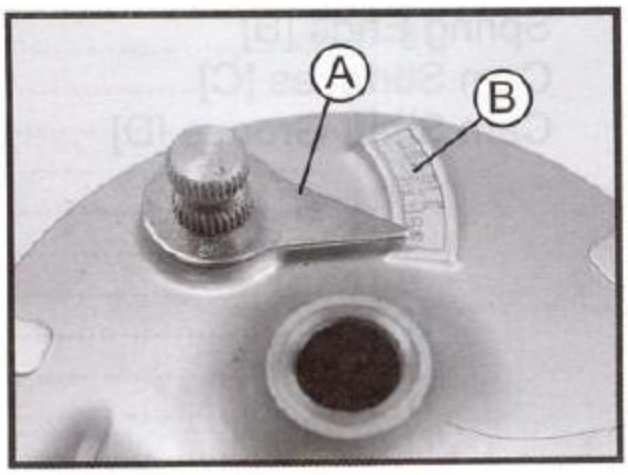


- Mark the position [A] of the cam lever before removal so that it can be installed later in the same position.
- Remove the brake cam lever.
- Pull the brake camshaft out from the brake panel inside.



Brake Panel Assembly

- Lubricate the brake camshaft.
- Fit the indicator [A] on the serration so that it points to the extreme right of the USABLE RANGE [B].

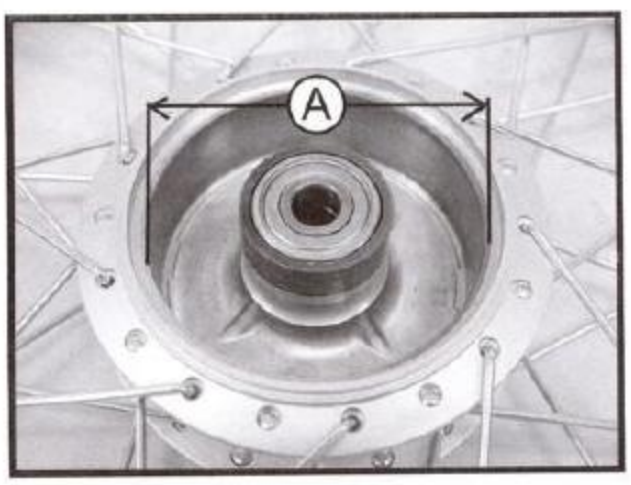


Brake Drum Wear Inspection

★ If the drum is worn unevenly or if it is scored, turn the drum downs on a brake drum lathe or replaces the hub with a new one. (Do not turn it down to the service limit, and do not turn it down if any diameter measurement exceeds the service limit).

- Measure the inside diameter [A] of the brake drum. Since uneven drum wear will decrease braking effectiveness, take measurement at a minimum of two places.

★ If any diameter measurement exceeds the service limit, replace the hub with a new one.

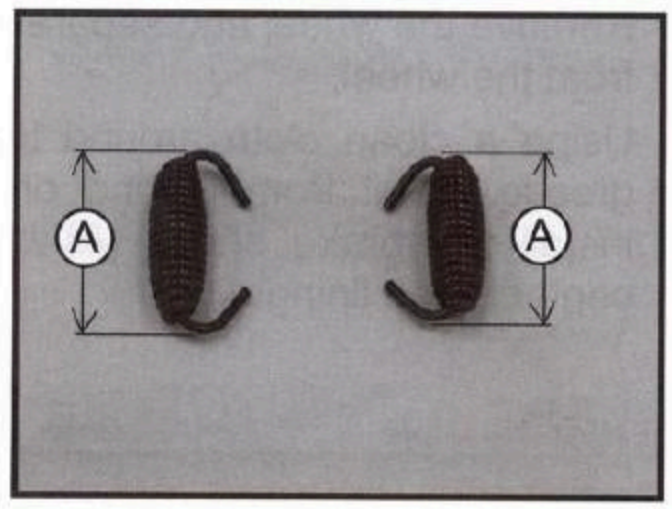


Brake Drum Inside Diameter

Standard:	**110.000 ~ 110.087 mm**
Service Limit:	**110.75 mm**

Brake Panel and Drum

Brake Shoe Springs Inspection

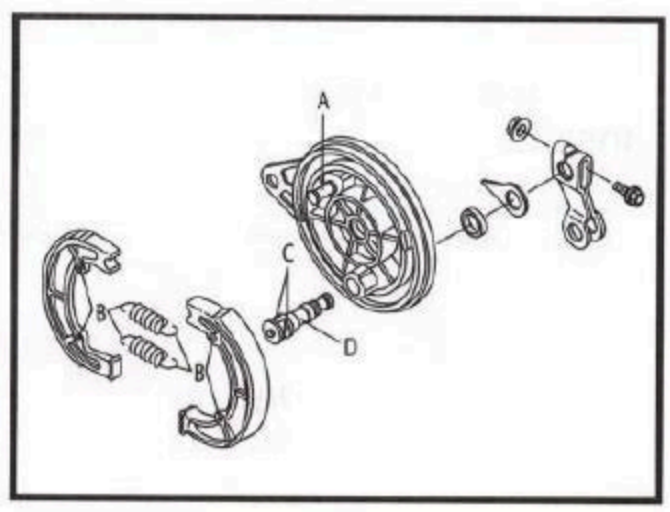


- Visually inspect the brake shoe springs for breaks or distortion.
★ If the springs are damaged in any way, replace them.
- Measure the free length of the brake shoe springs.
★ If either is stretched beyond the service limit, replace both springs.

Brake Shoe Spring Free Length [A]

Standard:	**32.0 ~ 33.0 mm**
Service Limit:	**34.1 mm**

Brake Panel Lubrication



- Disassemble the rear brake panel.
- Clean all old grease out of the brake parts with a cloth.
- Apply high-temperature grease to the following.
  Brake Shoe Anchor Pin [A]
  Spring Ends [B]
  Cam Surfaces [C]
  Cam Shaft Groove [D]

Suspension

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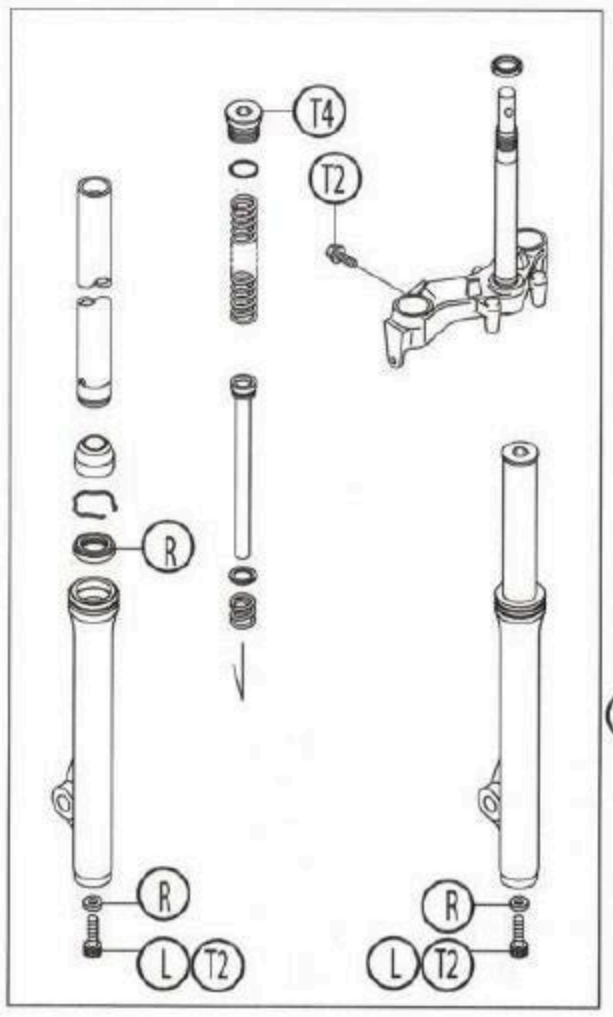
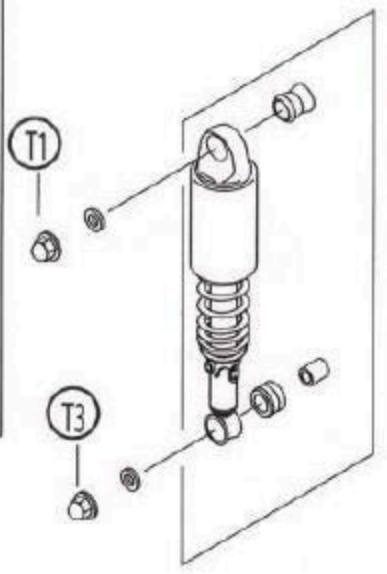
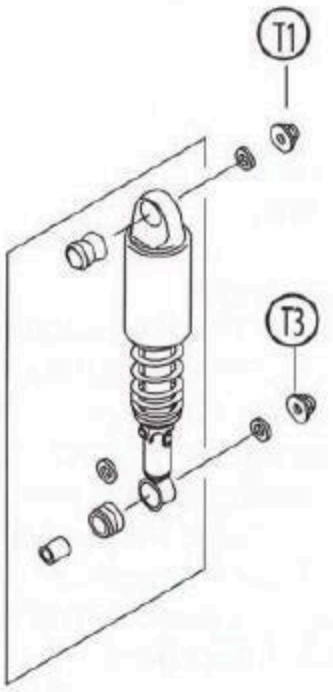
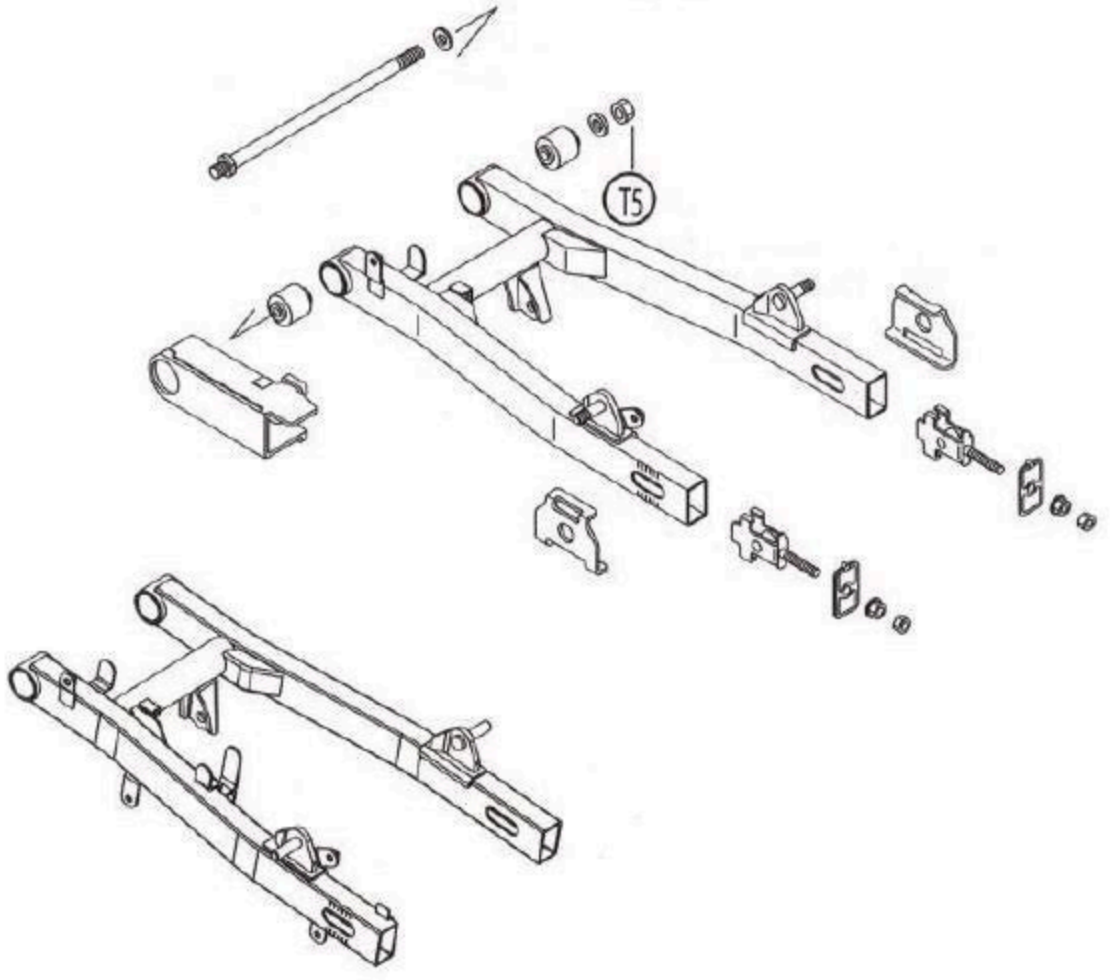
Exploded View









L: Apply non-permanent locking agent.
R: Replacement Parts.

T1: 10 N-m (1.0 kg-m, 7.0 ft-lb)
T2: 23 N-m (2.3 kg-m, 16.5 ft-lb)
T3: 34 N-m (3.5 kg-m, 25 ft-lb)
T4: 49 N-m (5.0 kg-m, 36 ft-lb)
T5: 59 N-m (6.0 kg-m, 43 ft-lb)

Specifications

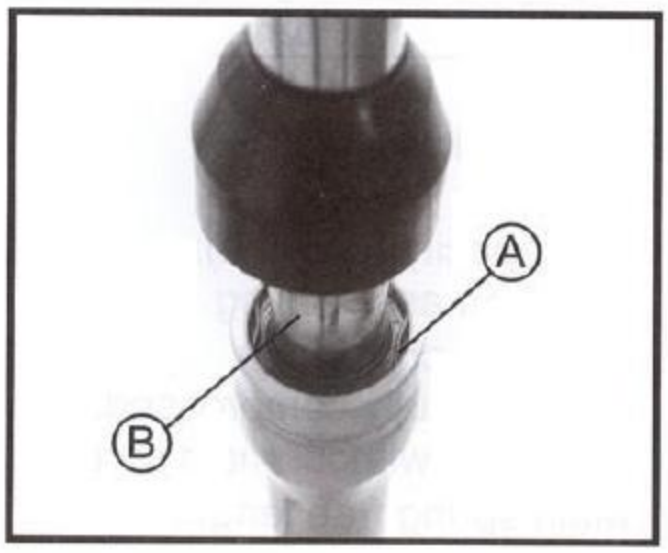
Item	Standard	Service Limit
Front Fork:		
Oil type	SAE 10W-20	---
Oil capacity (par unit):		
when assembling	60 ± 3 mL	---
when changing	51 mL	---
Oil level (fully compressed, without main spring)	108 ± 2 mm	---
Main spring free length	326 mm	319 mm

Special Tools - **Fork Cylinder Holder Handle: 57001-183**
Fork Cylinder Holder Adapter: 57001-1011
Oil Seal & Bearing Remover: 57001-1058
Fork Oil Level Gauge: 57001-1290

Front Fork

Cleaning

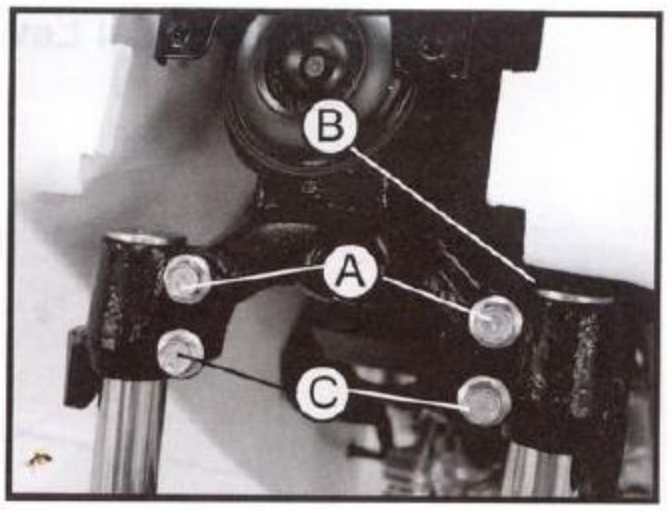
- Remove the fork dust covers and clean out any dirt or sand that has accumulated on the inner tube surfaces. Be careful not to damage either the oil seals [A] or the inner tube [B] surfaces.



Front Fork Removal (each fork leg)

- Remove:
  Leg Shields (see Frame chapter)
  Front Wheel (see Wheels/Tires chapter)
  Front Fender (see Frame chapter)

- Loosen the upper fork clamp bolts [A].
- Remove the fork top bolt [B] with the O-ring.
- Loosen the lower fork clamps bolts [C].
- With a twisting motion, work the fork leg down and out.



Front Fork Installation (each fork leg)

- Check the O-ring at the top plug and replace it with a new one if it is damaged.
- Check the fork oil level.
- Install the fork.
- Tighten the fork clamp bolts.

  Torque - Fork Lower Clamp Bolts:
  23 N-m (2.3 kg-m, 16.5 ft-lb)

- Tighten the top plug with the O-ring.

  Torque - Fork Top Plug:
  49 N-m (5.0 kg-m, 36 ft-lb)

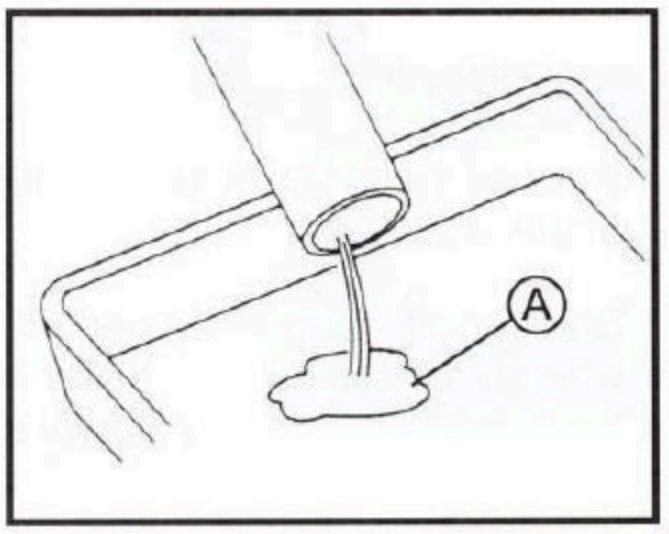
- Tighten the fork upper clamp bolts.

  Torque - Fork Upper Clamp Bolts:
  23 N-m (2.3 kg-m, 16.5 ft-lb)

Front Fork

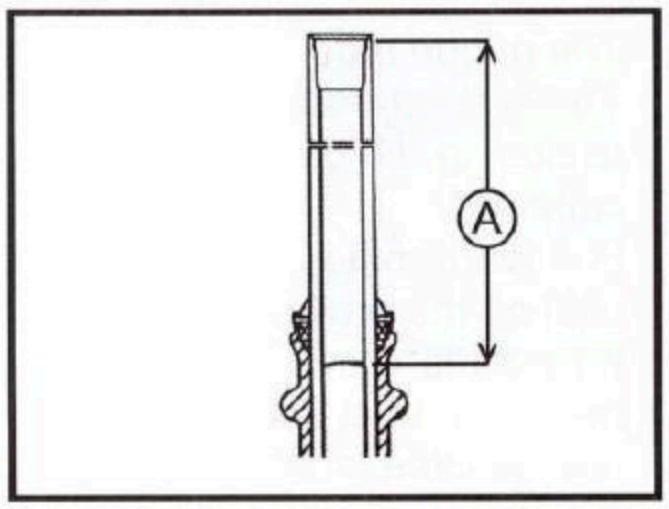
Fork Oil Change

- Remove:
  Front Fork Leg
  Long Springs
- Drain the oil into a suitable container, pumping as necessary to empty out all the oil [A].
- Do the same to the other fork leg.
- Pour in the specified type and amount of fork oil.



Front Fork Oil
Viscosity: SAE 10W-20
Amount per side:
When changing oil: approx. 51 mL
After disassembly and completely dry:
60 ± 3 mL

★ If necessary, measure the oil level as follows.
o Hold the outer tube vertically in a vise.
o Pump the inner tube several times to expel air bubbles.
o Fork fully by pushing up the outer tube.
o Wait until the oil level settles.
o With the fork leg fully compressed, insert a tape measure or rod into the inner tube, and measure the distance from the top of the inner tube to the oil level [A].

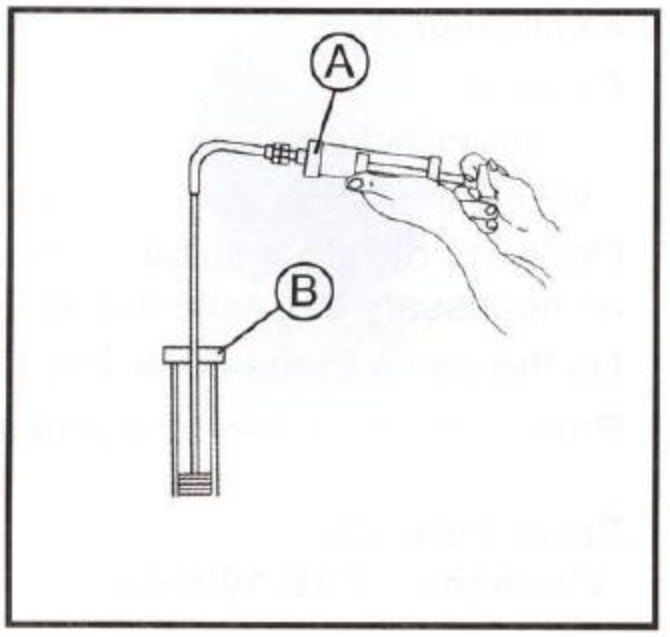


Fork Oil Level (Fully compressed without spring):
108 ± 2 mm

★ If the oil above or below the specified level, removes or add oil and recheck the oil level.

Front Fork

- Fork oil level may also be measured using the fork oil level gauge as follows.



Special Tool - Fork Oil Level Gauge: 57001-1290 [A]

o Set the oil gauge stopper [B] so that its lower side shows the oil level distance specified.
o With the fork leg fully compressed, and without fork spring, insert the gauge tube into the inner tube and position the stopper across the inner tube top end.

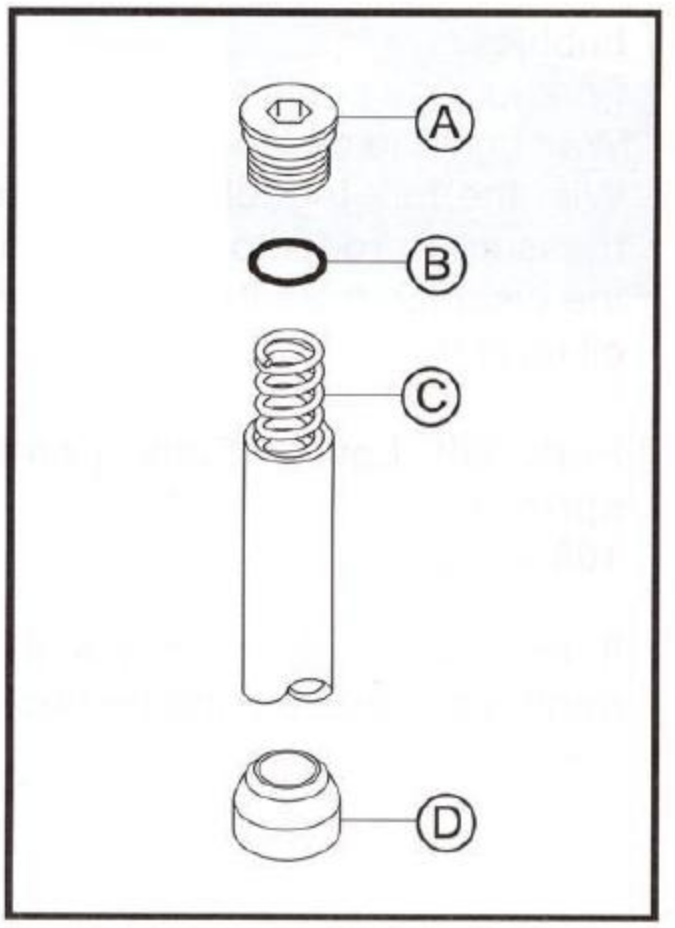
NOTE

o *The gauge tube is graduated in 1cm divisions.*
o *The syringe body is graduated in 10 mL division, excluding the gauge tube which is about 5 mL capacity.*
o Pull the handle slowly to draw out the excess oil until no more oil comes up the tube.
★ If no oil is drawn out, there is not enough oil in the inner tube. Pour in some more oil, then draw out the excess
★ If the oil is above or below the specified level, remove or add oil and recheck the oil level.

- Change the oil in the other fork leg in the same manner.
- Install the parts removed.

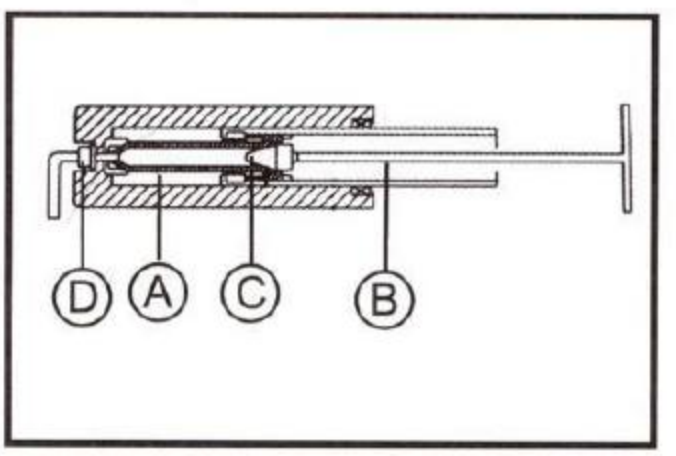
Disassembly (each fork leg)

- Remove:
  Top plug [A] with O-ring [B]
  Long Spring [C]
  Dust Seal [D]
- Drain the fork oil.



- Hold the outer tube horizontally in a vice.
- Stop the cylinder [A] from turning by using the fork cylinder holder handle [B] and adapter [C].

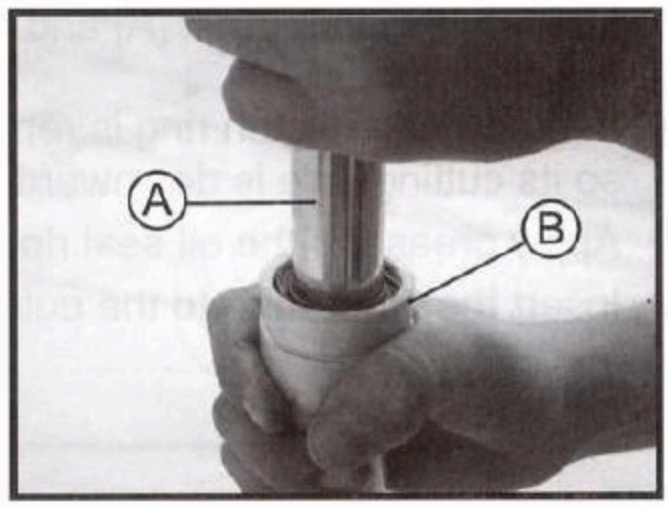
Special Tool - Fork Cylinder Holder Handle: 57001-183
Fork Cylinder Holder Adapter: 57001-1011



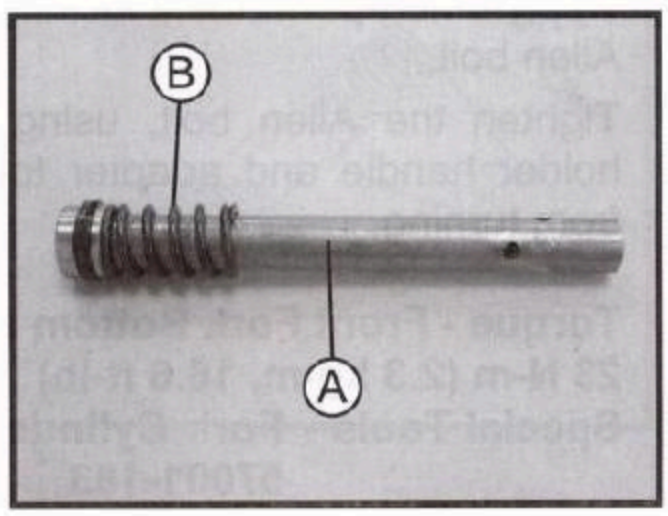
- Unscrew the Allen bolt [D], then take the bolt and gasket out the bottom of the outer tube.

Front Fork

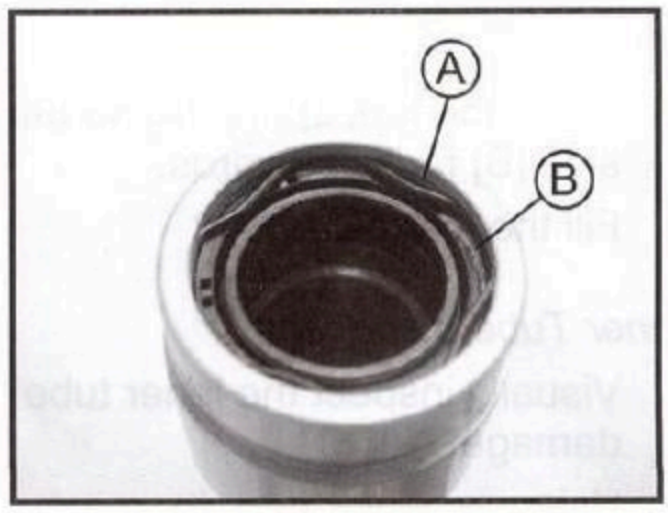
- Separate the inner tube [A] from the outer tube [B] by pulling them out.



- Remove the fork cylinder unit [A] and short spring [B] from the inner tube.



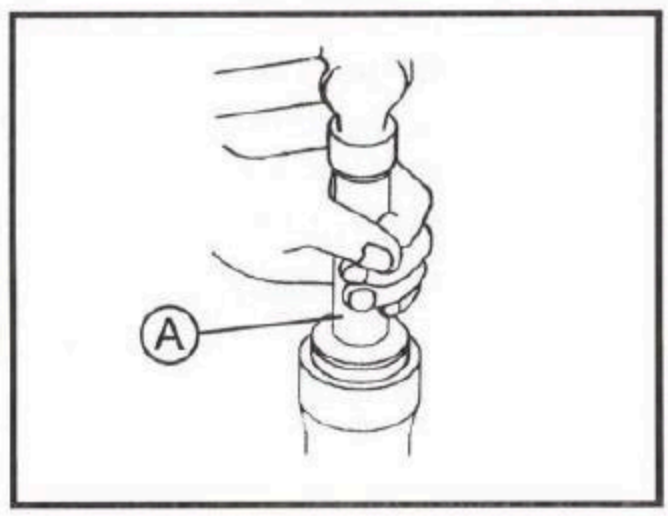
- Remove the retaining ring [A] from the outer tube.
- Remove the oil seal [B], using a thin-bladed screwdriver if necessary.



Assembly (each fork leg)

- Replace the following parts removed with new ones.
  Retaining Ring
  Oil Seal
  Bottom Allen Bolt Gasket
- Install the oil seal, using the fork oil seal driver [A].

  Special Tool - Fork Oil Seal Driver: 57001-1219



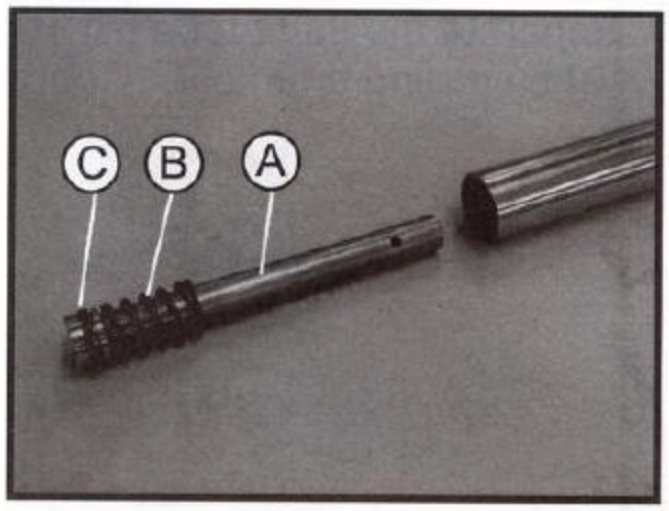
- Install the retaining ring with a new one.

Front Fork

- Insert the cylinder unit [A] and short spring into the inner tube [B].

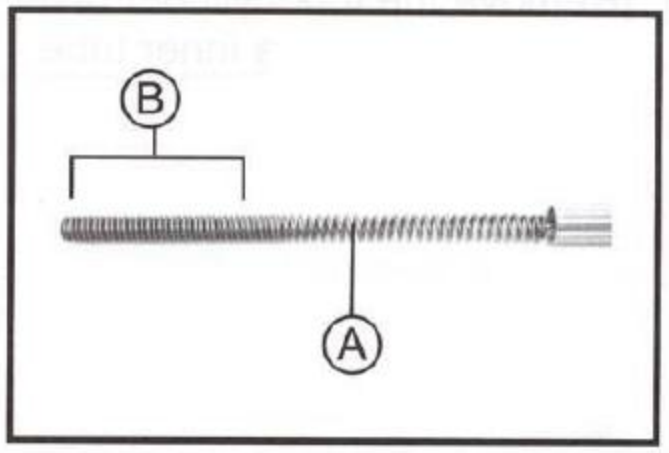
o If the cylinder piston ring is removed [C], install it so its cutting side is downward.

- Apply grease to the oil seal rip.
- Insert the inner tube to the outer tube.



- Apply a non-permanent locking agent to the Allen bolt.
- Tighten the Allen bolt, using the fork cylinder holder handle and adapter to stop the cylinder from turning.

Torque - Front Fork Bottom Bolts:
23 N-m (2.3 kg-m, 16.6 ft-lb)
Special Tools - Fork Cylinder Holder Handle: 57001-183
Fork Cylinder Holder Adapter: 57001-1011



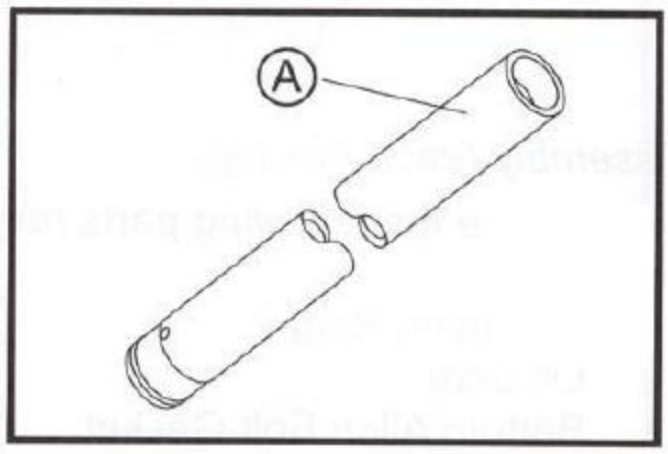
- Insert the fork spring [A] so that the closed coil side [B] faces upwards.
- Fill the fork oil.

Inner Tube Inspection

- Visually inspect the inner tube [A], and repair any damage.
- Using a wet-stone to remove sharp edges or raised areas that cause seal damage can sometimes repair nicks or rust damage.

★ If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.

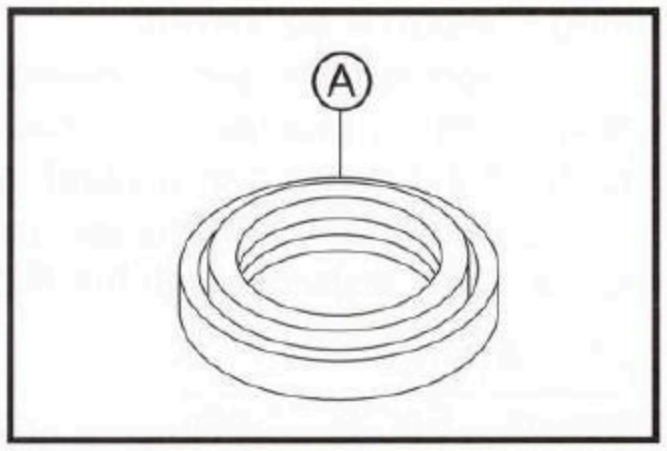
- Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.



CAUTION
If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

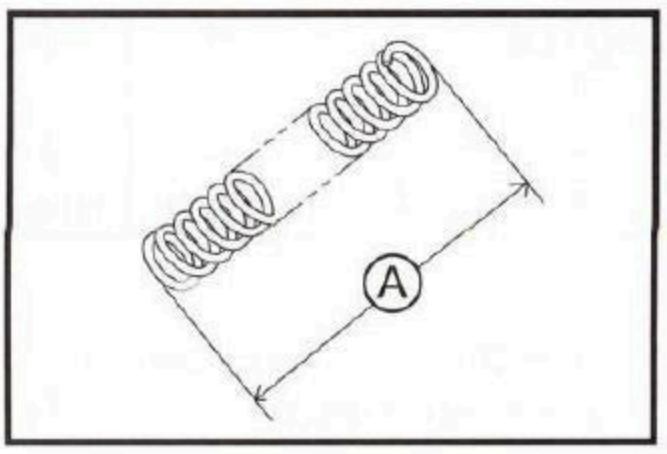
Front Fork

Oil Seal Inspection



- Inspect the oil seal [A] for any signs of deterioration or damage.
- ★ Replace it if necessary. Replace the oil seal with a new one whenever it has been removed.

Spring Tension Inspection



- Since the long spring [A] becomes shorter as it weakens, check its free length [B] to determine its conditions.
- ★ If the long spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Free Length

Standard:	**326 mm**
Service Limit:	**319 mm**

Rear Shock Absorbers

Spring Preload Adjustment

The spring adjusting sleeve on each shock absorber has 5 positions so that the spring can be adjusted for different terrain and loading conditions.

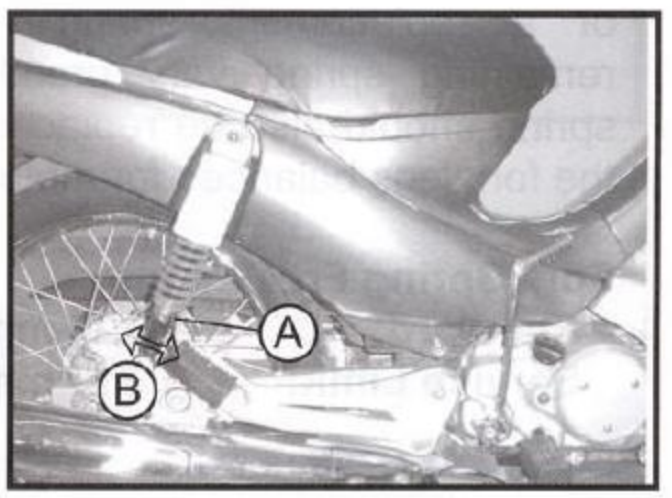
If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Action

Position	Spring Force	Setting	Load	Terrain	Speed
1	Stronger	Soft	Light	Good	Low
2(STD)		↑□	↑□	↑□	↑□
3					
4		↓□	↓□	↓□	↓□
5	↓□	Hard	Heavy	Bad	High

- Turn the adjusting sleeve [A] on each shock absorber to the desired position with a suitable bar [B].

o The adjusting sleeves must be turned to the same relative position.

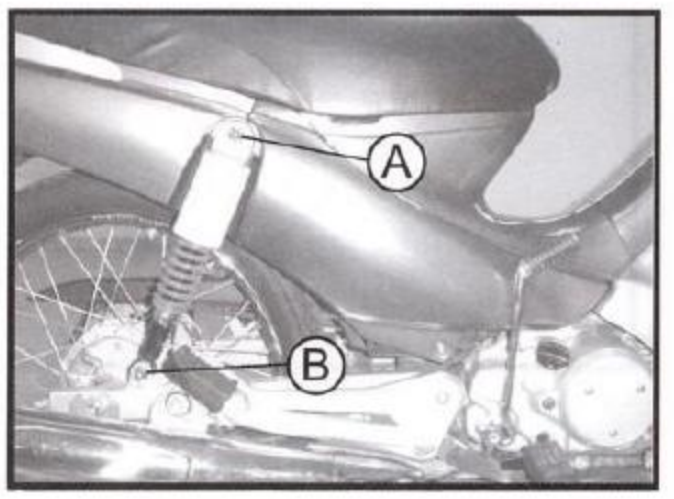


⚠ WARNING

If the adjusting sleeves are not adjusted equally, handling may be impaired and a hazardous condition may result.

Removal (each shock absorber)

- Set the motorcycle up on its center stand.
- Remove the shock absorber mounting bolt [A], nut [B] and pull off the shock absorber.



Installation (each shock absorber)

- Install the shock absorber with the spring adjuster boss facing outside.
- Tighten the shock absorber mounting bolt and nut.

Torque - Upper Mounting Bolt:
10 N-m (1.0 kg-m, 7.0 ft-lb)
Lower Mounting Nut:
34 N-m (3.5 kg-m, 25 ft-lb)

Rear Shock Absorbers

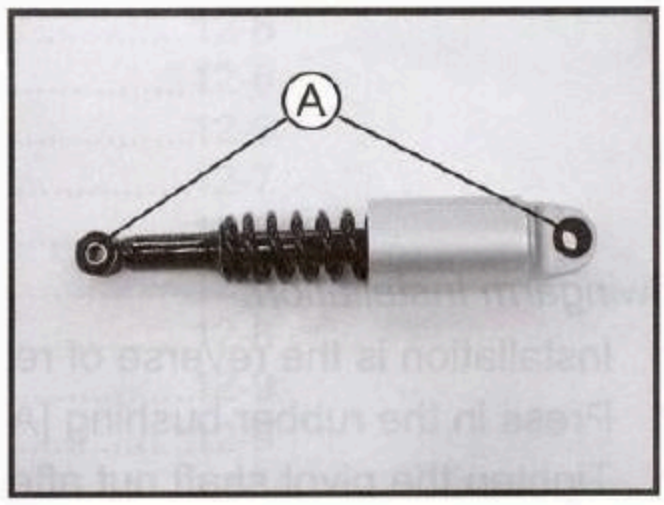
Shock Absorber Inspection

Since the rear shock absorbers are sealed units that cannot be disassembled, only external checks of operation are necessary.

- With the shock absorbers removed, compress each one and see that the compression stroke is smooth and that there is damping in addition to spring resistance to compression. When the unit is released, the spring should not suddenly snap it to full length. It should extend smoothly with notable damping. When the shock absorber is operated, there should be no oil leakage.

★ If either shock absorber does not perform all of these operations satisfactorily, or if one unit feels weaker than the other, replace both shock absorbers as a set. If only one unit is replaced and the two are not balanced, motorcycle instability at high speeds may result.

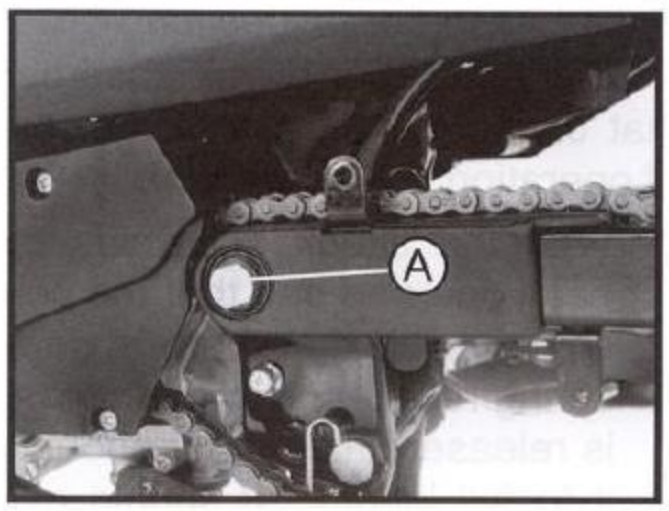
- Check the rubber bushing [A].
- Replace any that are worn, cracked, hardened, or otherwise damaged.



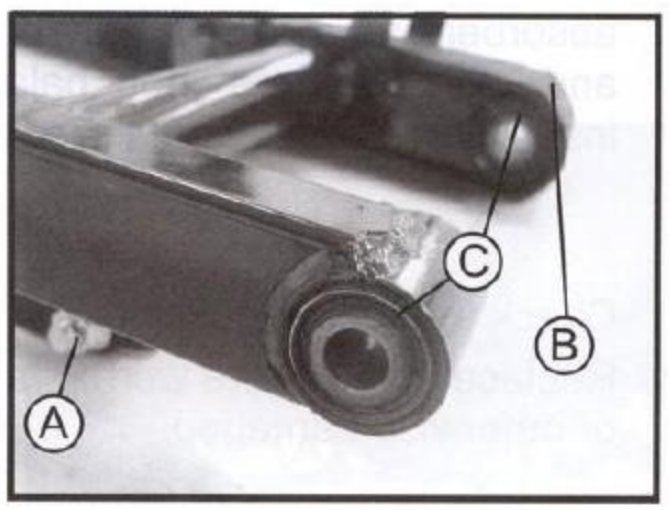
Swingarm

Swingarm Removal

- Set the motorcycle up on its center stand.
- Remove:
  Rear Wheel (see Wheels/Tires chapter)
  Left Side Cover (see Frame chapter)
  Drive Chain Cover
  Rear Footpeg Bracket (left and right)
  Rear Shock Absorber Lower Ends (left and right)
- Remove the pivot shaft nut and pull out the pivot shaft [A].
- Pulls back the swingarm and take off the swingarm.



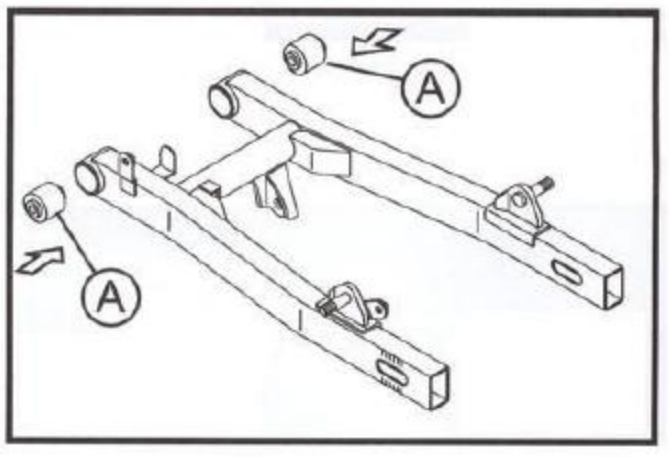
- Remove the torque link [A] and chain guide rubber [B].
- To remove the rubber bushing [C] at the pivot, tap out the bushing with a suitable tool.



Swingarm Installation

- Installation is the reverse of removal.
- Press in the rubber bushing [A] as shown.
- Tighten the pivot shaft nut after installed the rear shock absorber.

  Torque - Swingarm Pivot Shaft Nut:
  59 N-m (6.0 kg-m, 43 ft-lb)



- Tighten the front torque link nut.

  Torque - Front Torque Link Nut:
  25 N-m (2.5 kg-m, 18 ft-lb)

Rubber Bushing Inspection

- Visually inspect the rubber bushings.

★ If they are deteriorated or damaged, replace them.

Electrical System

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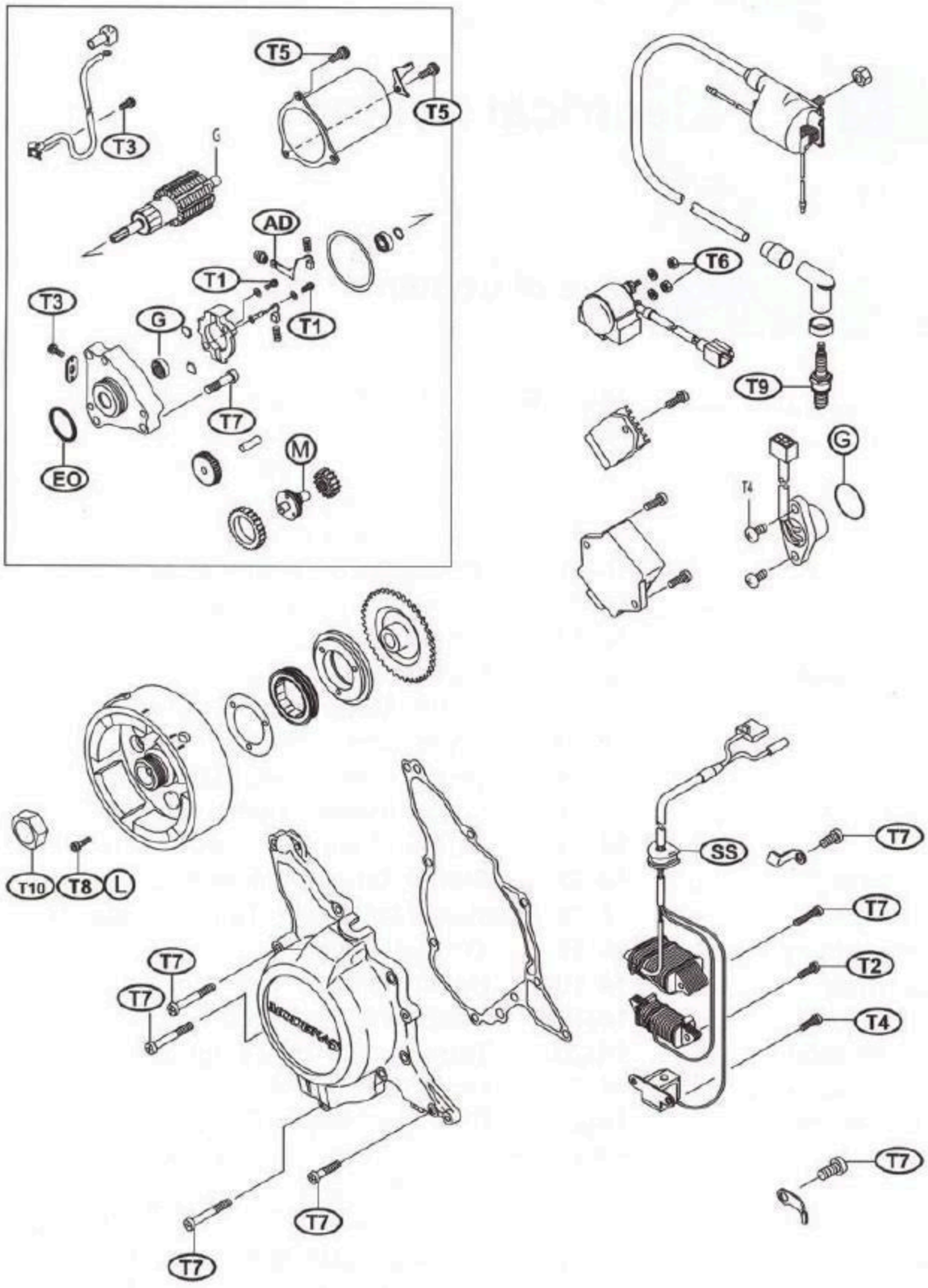
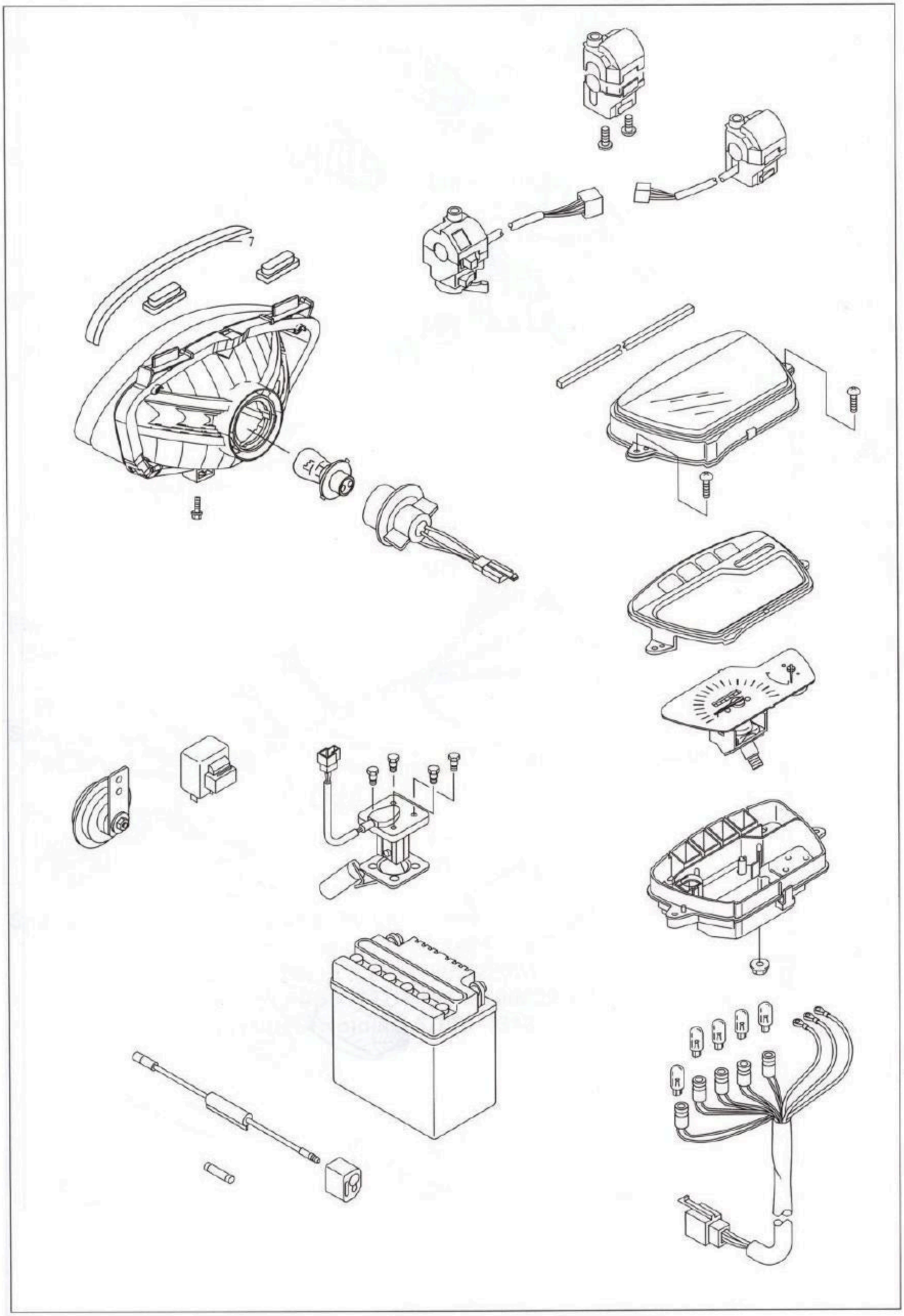
Exploded View



ED: Apply adhesive cement.
EO: Apply engine oil.
M: Apply molybdenum disulfide grease.
SS: Apply silicone sealant.
T1: 1 N-m (0.1 kg-m, 9 in-lb)
T2: 1.5 N-m (0.15 kg-m, 13 in-lb)
T3: 2 N-m (0.2 kg-m, 17 in-lb)
T4: 2.9 N-m (0.3 kg-m, 26 in-lb)
T5: 4.4 N-m (0.45 kg-m, 39 in-lb)
T6: 4.9 N-m (0.50 kg-m, 43 in-lb)
T7: 5.4 N-m (0.55 kg-m, 48 ft-lb)
T8: 12 N-m, (1.2 kg-m, 104 in-lb)
T9: 13 N-m, (1.3 kg-m, 9.5 ft-lb)
T10: 42 N-m (4.3 kg-m, 31 ft-lb)

Exploded View



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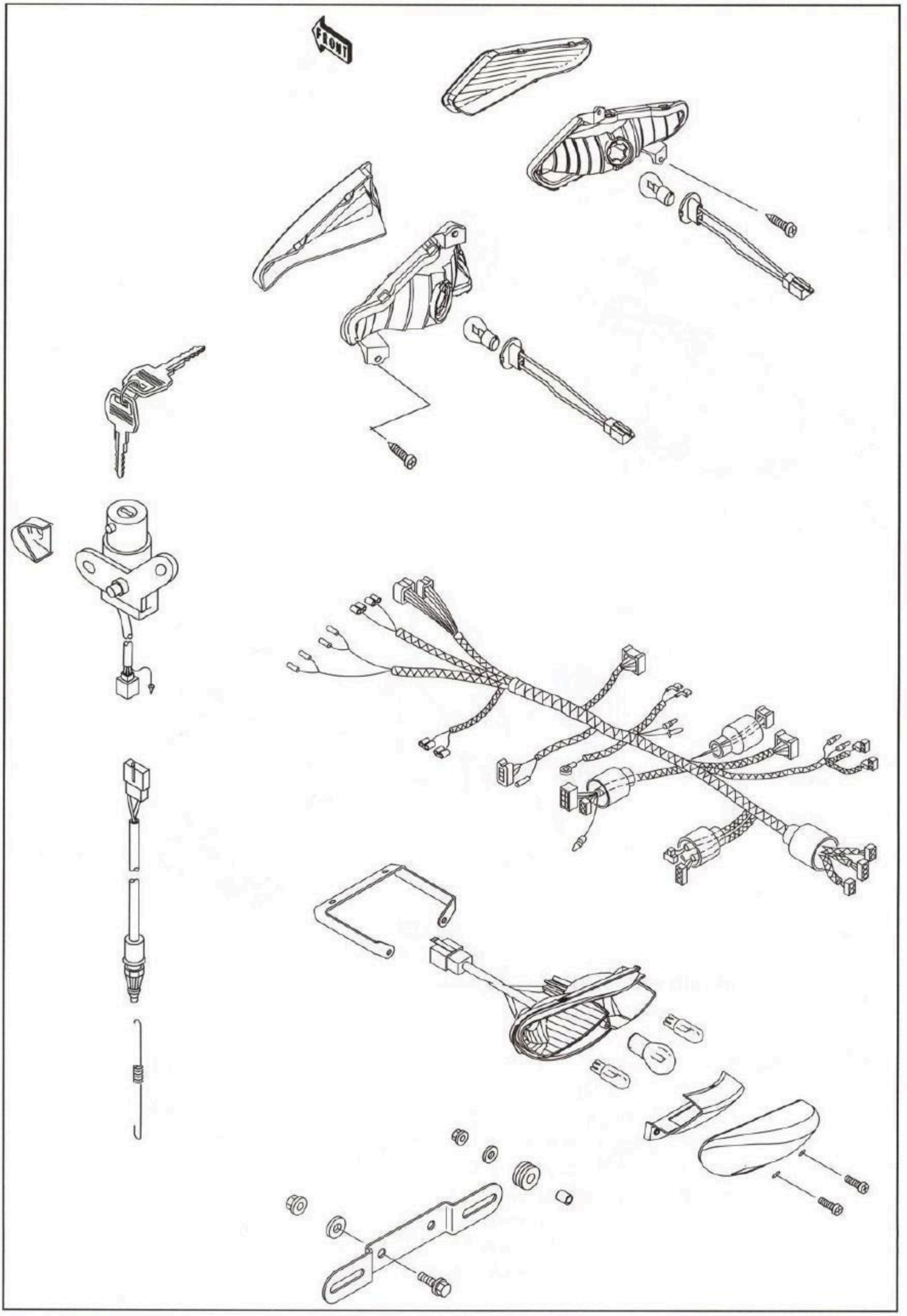

Specifications

Item	Standard	Service Limit
Battery:		
Capacity	12 V 3 Ah	---
Elecrolyte level	Between level lines	---
Specific gravity	1.24 @ 20°C (68°F)	---
Charging System:		
Regulator/rectifier output voltage	Battery voltage ~ 14.5 + 0.5 V	---
Charging coil resistance	0.48 ~ 0.72 Ω : yellow	---
	0.8 ~ 1.2 Ω : white	---
Alternator output voltage	2.6A/14V @ 8 000 rpm	---
Ignition System:		
Pickup coil resistance	396 ~ 594 Ω @ 20°C (68°F)	---
Air Gap	0.75 mm	
Ignition coil:		
Primary winding resistance	0.48 ~ 0.58 Ω	---
Secondary winding resistance	7.2 ~ 8.8 KΩ	---
primary (-) terminal ~ secondary coil		
Exciter coil resistance	248 ~ 372 Ω: @ 20° (68°F)	---
Spark plug:		
Standard plug	NGK C6HSA	---
Option	ND U20FS-U	---
Gap	0.6 ~ 0.7 mm	---
Electric Starter System:		
Starter motor		
Brush length:	7 mm	3.5 mm
Commutator diameter:	22 mm	21.5 mm
Switches, Sensors:		
Rear brake light timing	On after about 15 mm pedal travel	---
Fuel level sensor resistance:		
Full position	4 ~ 10 Ω	---
Empty position	90 ~ 100 Ω	---

Special Tools - **Spark Plug Wrench, Hex 16: 57001-1262**
Hand Tester: 57001-983
Flywheel Puller: 94000-28051
Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216
Flywheel Holder: 57001-1313

Specifications

Item	Standard	Service Limit
Battery:		
Capacity	AN110-R1 12 V 3 Ah AN110-H1 12 V 5 Ah	---
Elecrolyte level	Between level lines	---
Specific gravity	1.24 @ 20˚C (68˚F)	---
Charging System:		
Regulator/rectifier output voltage	Battery voltage ~ 14.5 + 0.5 V	---
Charging coil resistance	0.48 ~ 0.72Ω : yellow 0.8 ~ 1.2Ω : white	--- ---
Alternator output voltage	2.6A/ 14V @8 000 rpm	---
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Air Gap	0.75 mm	
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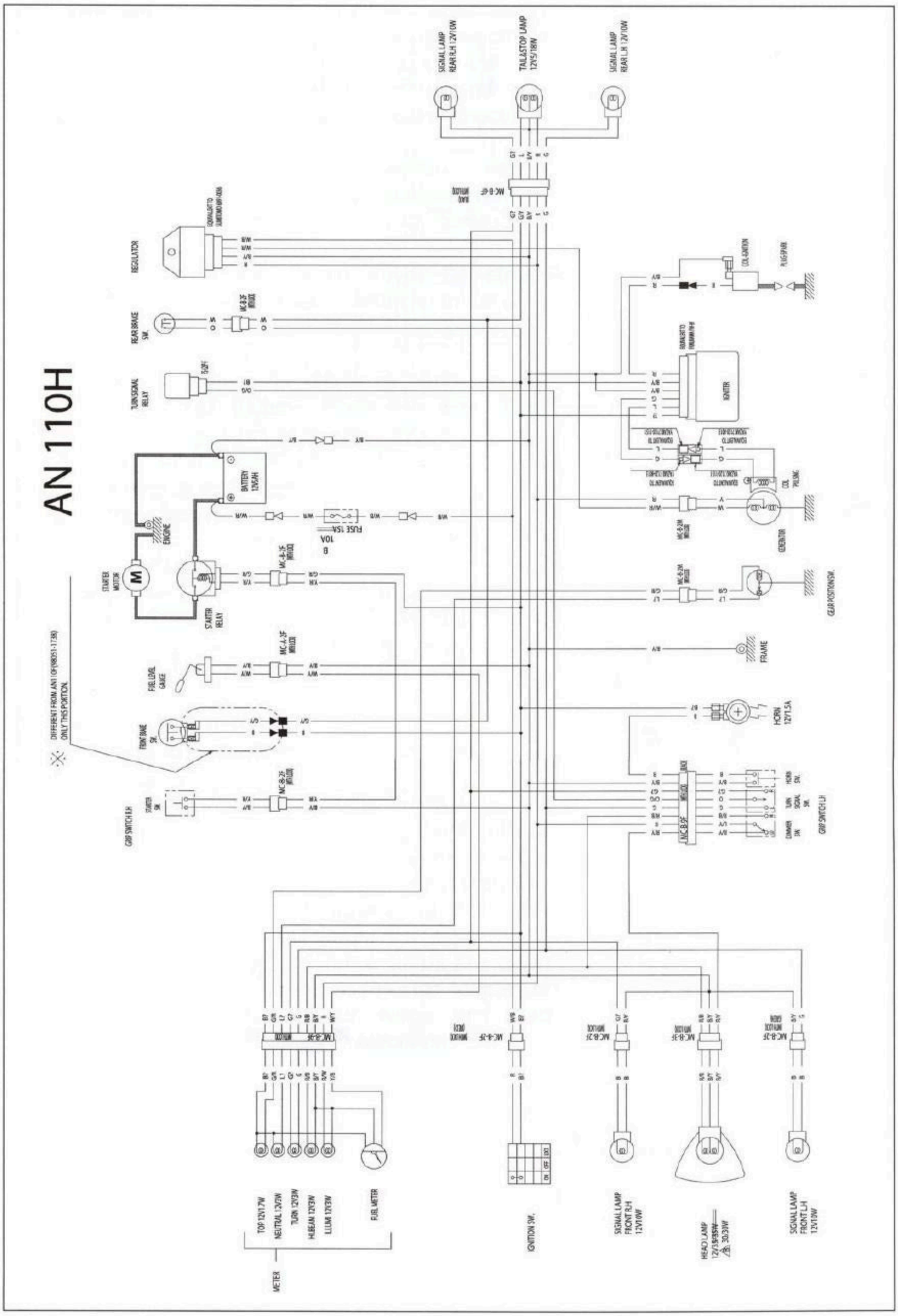
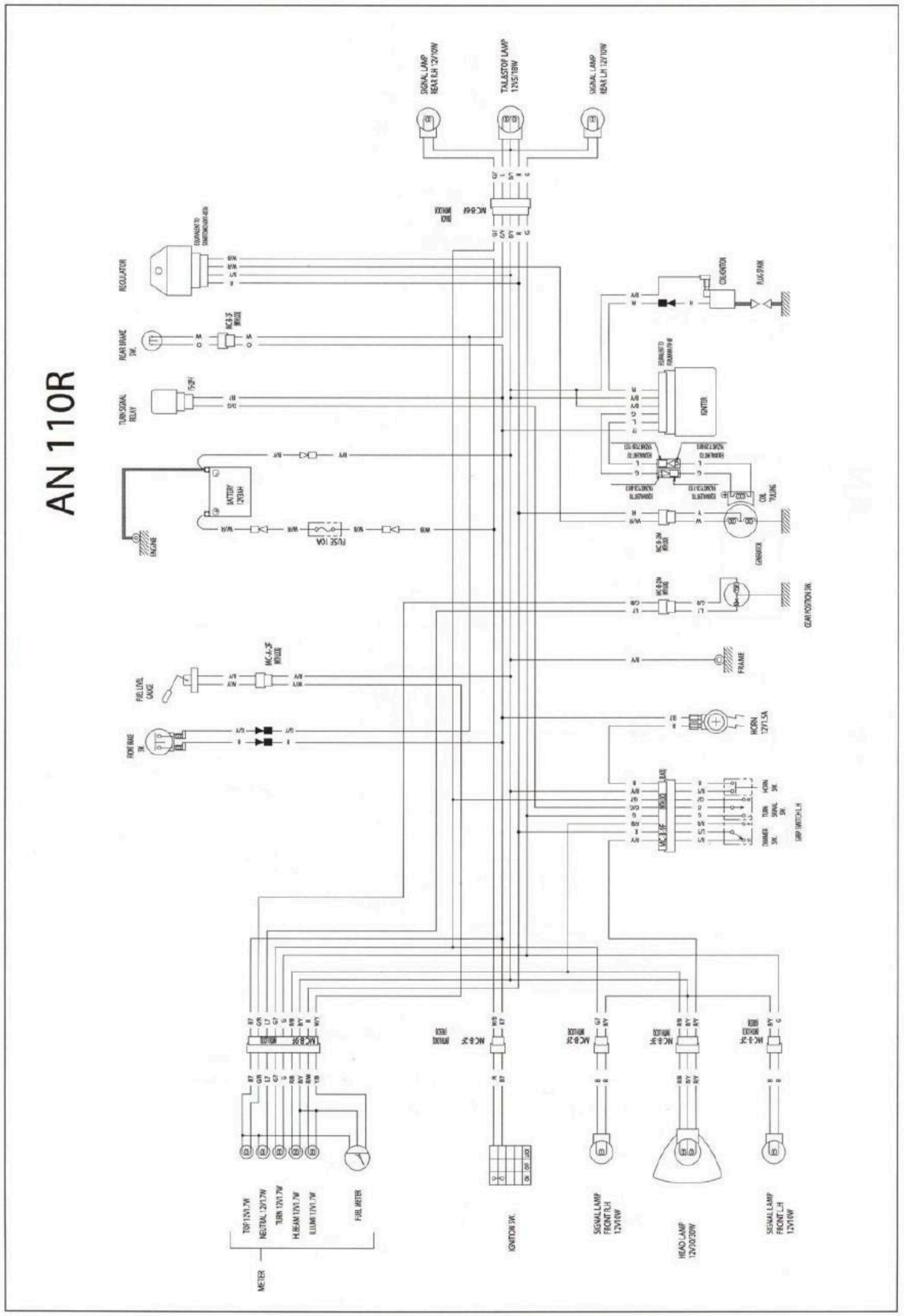
Wiring Diagram



Wiring Diagram



MODENAS

SERVICE MANUAL

AN110E-D310
AN110F-D310

AN110R-C310
AN110H-C310

THE END

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